

26

113

-A 2

# FM 6-135

WAR DEPARTMENT FIELD MANUAL

---

FIELD ARTILLERY

# FORWARD OBSERVATION

---

WAR DEPARTMENT : 10 AUGUST 1944



*WAR DEPARTMENT FIELD MANUAL*  
*F M 6-135*

---

**FIELD ARTILLERY  
FORWARD  
OBSERVATION**



*WAR DEPARTMENT • 10 AUGUST 1944*

---

*United States Government Printing Office  
Washington : 1944*

For sale by the Superintendent of Documents, U. S. Government Printing Office  
Washington 25, D. C. - Price 15 cents.

WAR DEPARTMENT,  
WASHINGTON 25, D. C., 10 August 1944.

FM 6-135, Forward Observation, is published for the information and guidance of all concerned.

[A. G. 300.7 (16 Jul 44).]

BY ORDER OF THE SECRETARY OF WAR:

G. C. MARSHALL,  
*Chief of Staff.*

OFFICIAL:

J. A. ULIQ,  
*Major General,*  
*The Adjutant General.*

DISTRIBUTION:

As prescribed in paragraph 9a, FM 21-6 except Hq AGF (20), D6 (6), Gen & Sp Sv Schs only as follows: Cav Sch (150), FA Sch (600), Inf Sch (8000), Armd Sch (300), TD Sch (250), AAA Sch (200), Cws Sch (50), CA Sch (50), Comd and Gen Stf Sch (50); Base Comds (3); Island Comds (3); Def Comds (3); Harbor Def (3); Sectors (3); Sub-Sectors (3); B 6 (6); IB 44 (3); R 2, 7, 17, 18 (5), 6 (6); I R 4, 44 (3); Bn 2, 7, 17, 18 (2), 6 (6); I Bn 44 (3); C 2, 7, 17, 18 (3), 6 (6); IC 44 (3).

IB 44: T/O & E 44-10-1;

IR 4: T/O & E 4-111;

IR 44: T/O & E 44-12;

I Bn 44: T-O & E 44-15; 44-115;

IC 44: T/O & E 44-16; 44-17; 44-116; 44-117.

For explanation of symbols, see FM 21-6.

**DEPOSITED BY THE  
UNITED STATES OF AMERICA**

SEP 11 '42

## CONTENTS

### CHAPTER 1. TACTICAL PRINCIPLES.

<i>Section I. General.</i>	<i>Paragraph</i>	<i>Page</i>
Purpose and scope .....	1	1
<i>II. Observation.</i>		
General .....	2	1
Ground observation .....	3	2
Selection of observation posts .....	4	3
Organization of observation posts .....	5	4
Observer's reports .....	6	11
Check list for observer .....	7	11
<i>III. Forward Observation.</i>		
General .....	8	14
Procedure of forward observer .....	9	15
Communication .....	10	25
Hints for forward observer .....	11	27

### CHAPTER 2. ADJUSTMENT OF ARTILLERY FIRES BY FORWARD OBSERVERS.

<i>Section I. General.</i>		
General .....	12	29
<i>II. Nonartillery observers.</i>		
General method .....	13	30
Hints for nonartillery observers .....	14	32
<i>III. Artillery observers.</i>		
General .....	15	36
Target designation and request for fire .....	16	37
Reports to observer .....	17	39
Sensing, bracket fire .....	18	39
Precision fire .....	19	44
Conversion of sensings to commands .....	20	45
Illustrative examples .....	21	47
<b>INDEX.....</b>		<b>69</b>

III



# CHAPTER 1

## TACTICAL PRINCIPLES

---

### Section I. GENERAL

**1. PURPOSE AND SCOPE.** a. This manual provides instructions for training commissioned or enlisted personnel in the tactics and technique of forward observation. The principles set forth apply not only to field artillery personnel, but also to the personnel of the supported arms who have occasion to adjust artillery fire by forward observation methods.

b. The forward observer must not only be prepared to adjust and know how to adjust fire on targets, but also he should be skilled in the location of targets, in the tactics and technique of the enemy, and in the ability to foresee movements, just as a good hunter anticipates the movement and location of game through his knowledge of their habits. Successful adjustment of fire on the part of the forward observer is the culmination of skillful thought, observation, preparation, aggressiveness and foresight. Without targets the best artillery battalion is of little use. The forward observer is the artillery front line representative for obtaining information of the enemy, especially targets appropriate to be taken under fire by the artillery.

### Section II. OBSERVATION

**2. GENERAL.** Observation is essential in order that field artillery may accomplish its mission of rendering continuous and close support to other arms. The skillful maneuver of observation is essential to the effective maneuver of fire power. Observation, together with air photography, is the principal means of the artillery for locating targets and gaining informa-

tion of the enemy and probable target locations. Observation is necessary in the discovery and attack of targets of opportunity and the surveillance of prearranged fires. It serves also as a means of gaining information of our own troops and in this respect supplements liaison with the supported arm. Artillery observation should cover the entire zone of action, or defensive sector, of the supported unit and should extend sufficiently deep into the hostile position to cover those areas from which fire can be delivered on our troops. In order to cover the entire zone of action or defensive sector to the required depth, field artillery units utilize both ground and air observation. Ground observation is performed by forward observers (close support); observers at battalion and battery observation posts (general surveillance); or sound and flash units.

**3. GROUND OBSERVATION.** **a. General.** Ground observation is of basic importance for the location of targets and the conduct of fire. It must function day and night. Artillery is charged with the duty of keeping unbroken watch on friendly and enemy troops; enemy activity and changes in the situation must be promptly reported.

**b. Organization and operation of observation posts.**  
(1) An artillery observation party should preferably consist of not less than three men. The senior officer or noncommissioned officer is responsible for keeping the zone of observation under constant surveillance. Generally, two men observe while the third operates the means of signal communication. When it is necessary to make a written report of observations, one of the two observers acts as recorder. When the enemy is not dangerously active, one observer in observation is sufficient; the other observer(s) rests, and acts as a relief. The entire observation party should be relieved every 48 hours if practicable.

(2) Upon occupying an observation post, the senior observer first determines the map location of the observation post and orients his map. A photomap, an oblique, and (or) vertical air photos of the *target area* are of great use to the observer. With other observers of the party, he then makes a study of the terrain under observation with respect to the map, identifying on the ground the base point, check points, reference points, and other prominent features. If not restricted, he should "shoot

himself in" by registering on one or more check points. Reference lines should be staked in on the ground for night orientation of instruments.

(3) The senior observer makes a study of the areas in the zone of observation into which he can see and notes those areas on his map which are defiladed from his view. An overlay showing these defiladed areas and the location of the observation post is sent to the battalion command post. A panoramic sketch of the zone of observation should be made, showing prominent features, base point, check points, and important targets. This sketch, together with the map and a record of adjusted data, serves as a record of observations and permits rapid delivery of fire. An oblique air photo can be used instead of a sketch.

(4) Alternate observation posts must be reconnoitered and prepared to avoid neutralization by smoke, hostile fires, local attacks, or weather. These alternate observation posts must be located so as to assure continuous observation whether the action goes forward, backward, or to either flank. Visitors' observation posts should be provided for military observers and correspondents so that the working observation post is not given away by transients. (These observation posts should not be in the same vicinity.)

**4. SELECTION OF OBSERVATION POSTS.** a. General. (1) When an observation post is selected, consideration should be given to ease of concealment of location and routes thereto, ease of installation and maintenance of signal communication, and avoidance of outstanding landmarks.

(2) Observation posts are selected to give the most extensive view possible of the zone of observation. Observation posts selected along the axis of advance will save time and wire. Available flank observation should be exploited to give observation in depth and to overcome enemy defilade.

(3) Forward observers must select observation posts from which they can see the movement of the supported unit. Such posts should not be so far forward that the forward observer and his party will be neutralized and pinned to the ground by hostile fire. If the forward observer enters the fire fight he will not be able to carry out his primary mission. However he must not be so far back that contact with the supported unit is lost.

**b. Forward and reverse slopes.** The advantages and disadvantages of forward and reverse slope positions are:

(1) *Reverse slope position* (fig. 1). (a) *Advantages.*

1. May be initially occupied during daylight.
2. Allows greater freedom of movement to personnel during daylight. However, *no unnecessary movement* should be permitted.
3. Facilitates installation, maintenance, and concealment of communication installations.

(b) *Disadvantages.*

1. Usually affords a limited view to the immediate front.
2. Fire adjusted on the crest may neutralize the installation.
3. Instruments and personnel projecting above the crest are difficult to conceal. This disadvantage is minimized if the hill being occupied blends into another hill farther back; it is at a maximum when the hill being occupied forms the skyline as seen from the hostile area.

(2) *Forward slope position* (fig. 2). (a) *Advantages.*

1. May be removed from crest so that fire falling on crest will not neutralize the installation. The enemy is forced to neutralize the entire forward slope to insure neutralization of all observation posts thereon.
2. Affords better view of immediate foreground.
3. Affords a covering background which facilitates concealment.

(b) *Disadvantages.*

1. Must be occupied under cover of darkness to prevent discovery.
2. Location cannot be changed during daylight without risk of disclosing location.
3. Daylight maintenance of signal communication is difficult.

## 5. ORGANIZATION OF OBSERVATION POSTS.

The organization of the observation post is progressive. Initially the observer takes advantage of such cover as may be available—behind a rock or bush (figs. 3 and 4), in a shellhole (fig. 5), or in back of an abandoned vehicle (fig. 6). As time

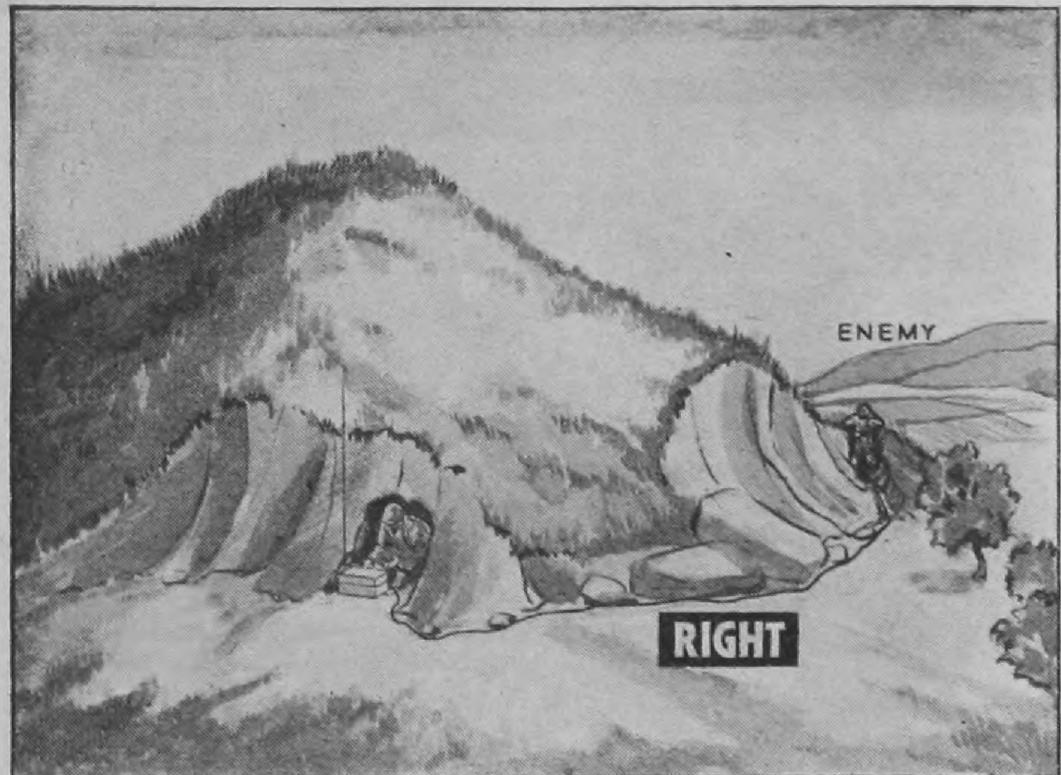
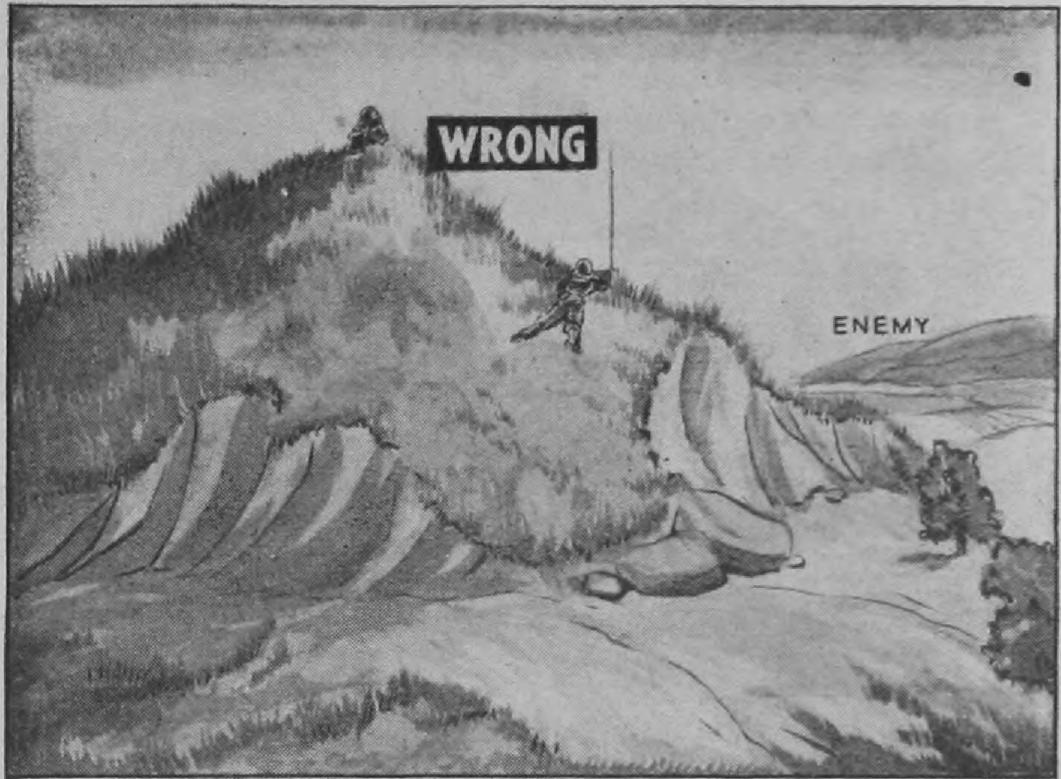
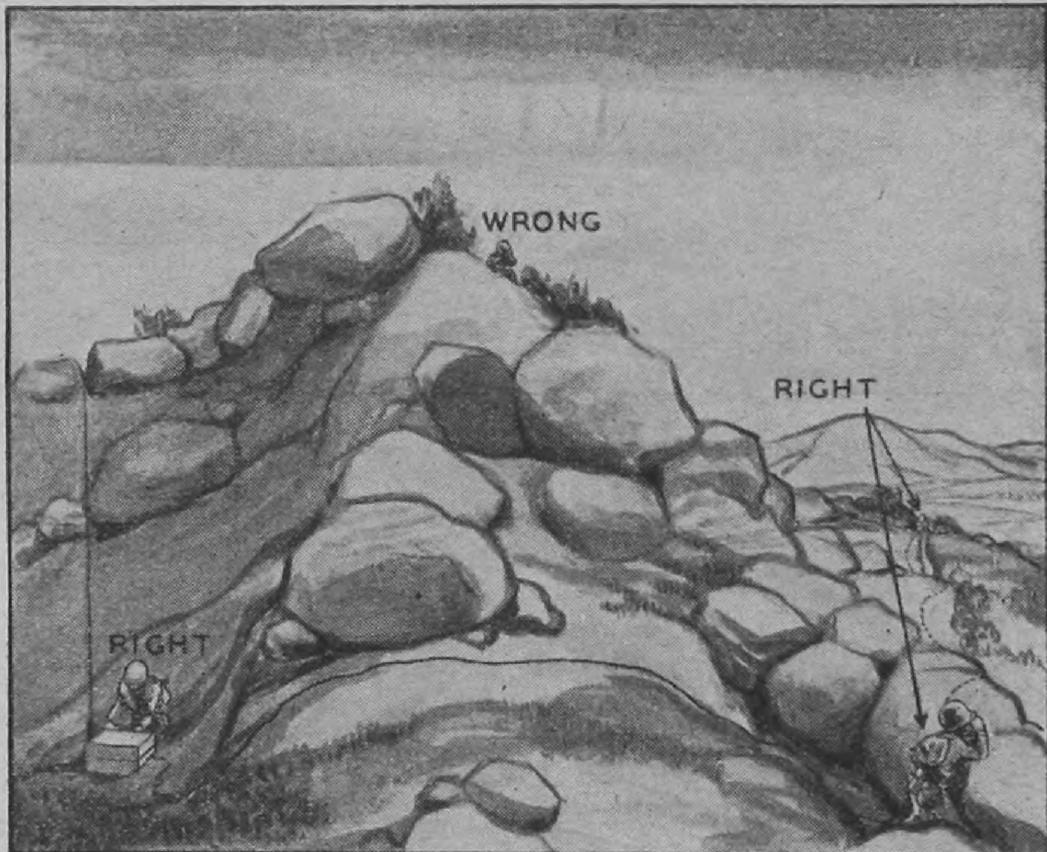


Figure 1. Reverse slope observation.

permits, a trench or prone shelter is dug (fig. 7). Later, deep fox holes are dug on the reverse slope. Equipment, rations, communication equipment and other vital installations are kept there. As work continues, the trench is deepened, reveted as necessary, and provided with overhead cover. A shelter may be



*Figure 2. Forward slope observation.*

dug into a natural fold or slope and apertures cut from within. Observation posts located on forward slopes should have a covered route of approach or communication trench connecting them to the reverse slope (fig. 8).

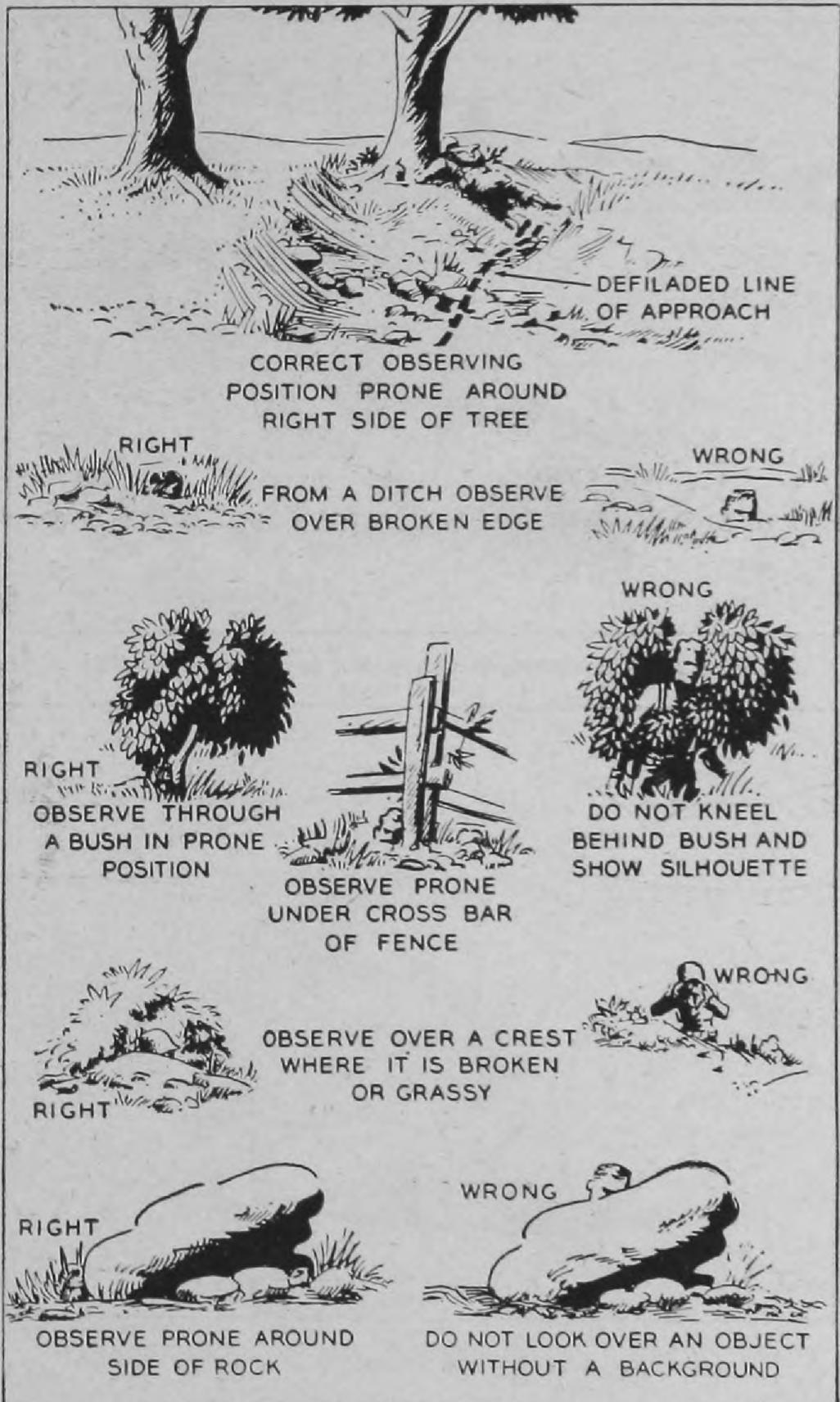
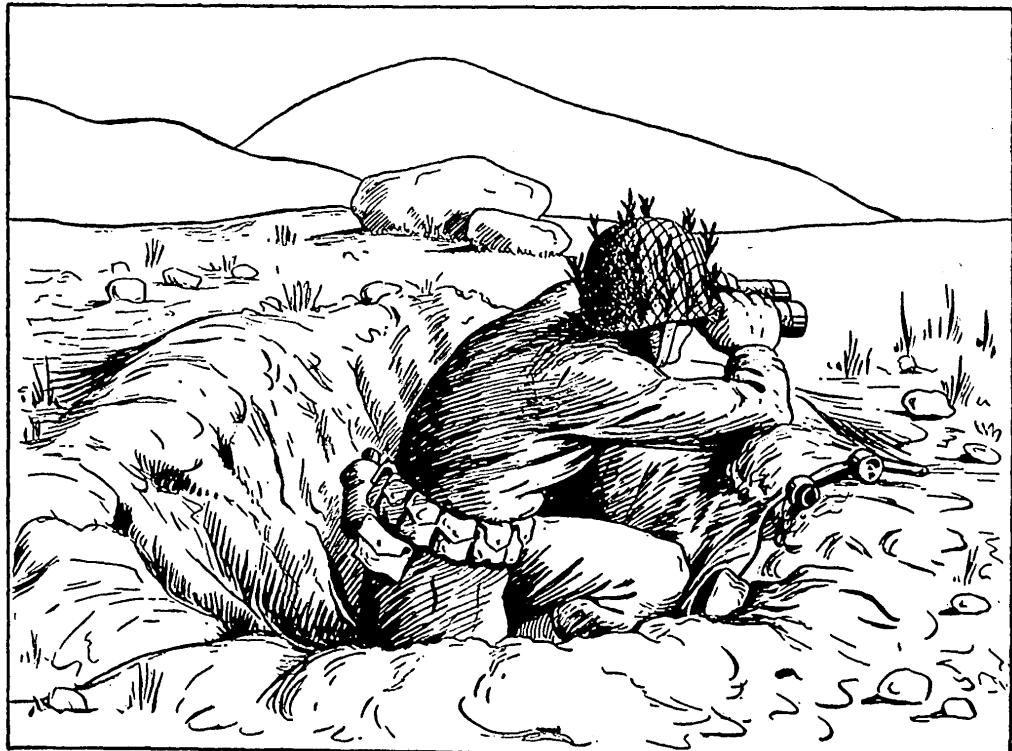


Figure 3. Methods of observing.



*Figure 4. Temporary observation post behind a rock or bush.*



*Figure 5. Temporary observation post in a shell hole.*

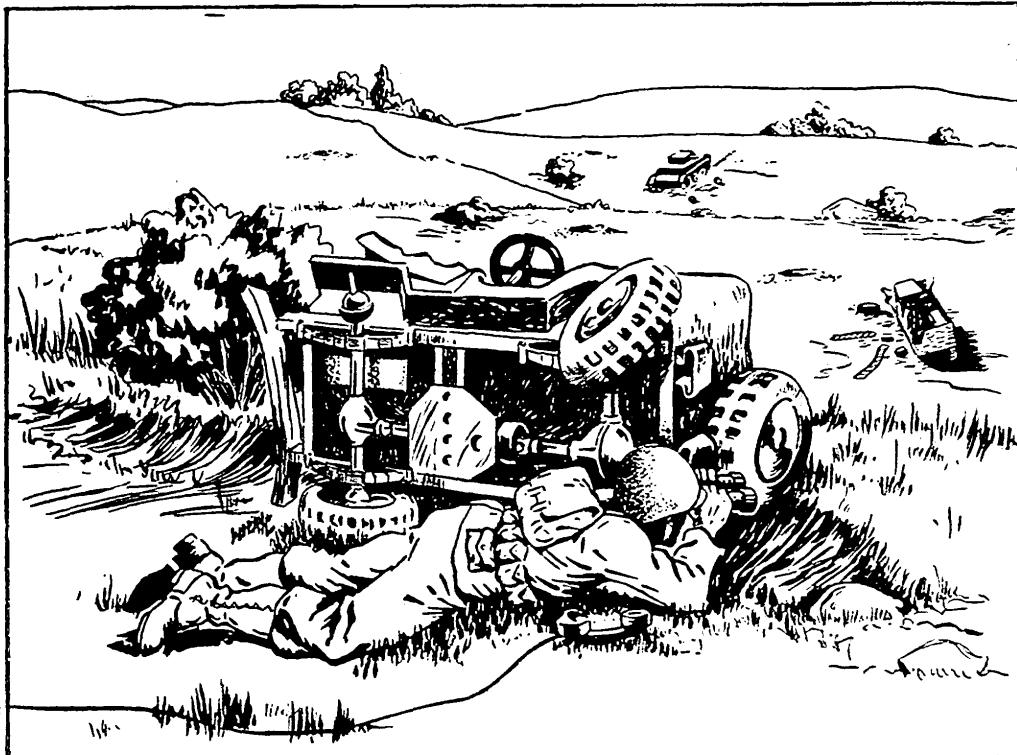
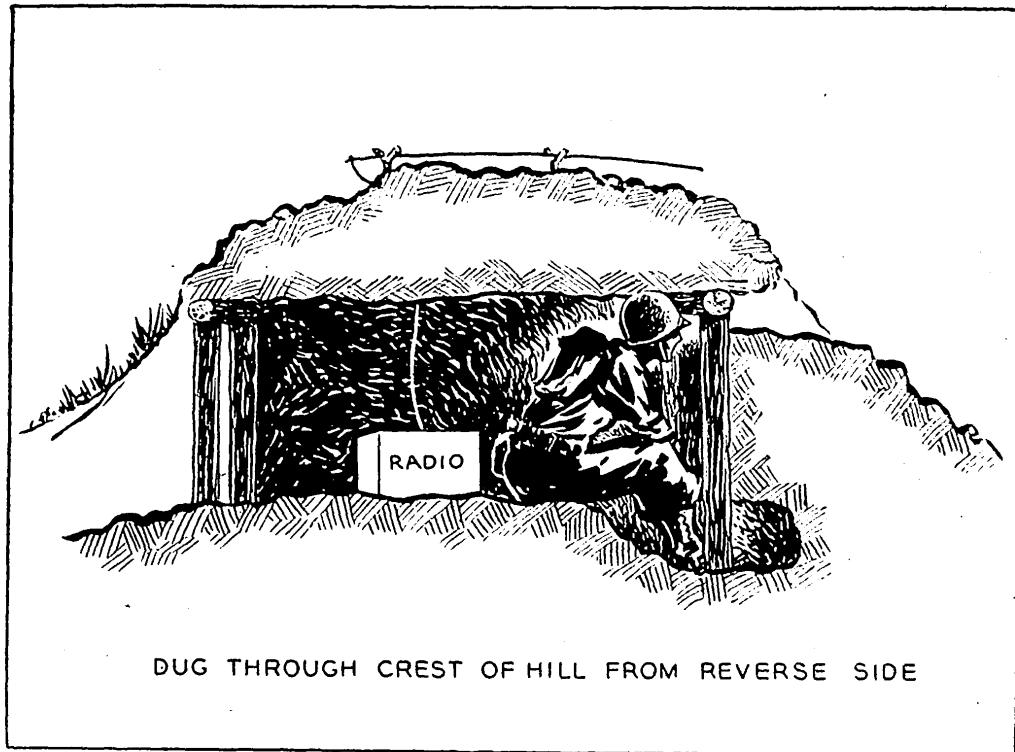


Figure 6. Temporary observation post behind a convenient object, if it is not obvious.



Figure 7. Shallow trench observation post.



DUG THROUGH CREST OF HILL FROM REVERSE SIDE

Figure 8. Dug-in forward observation post.

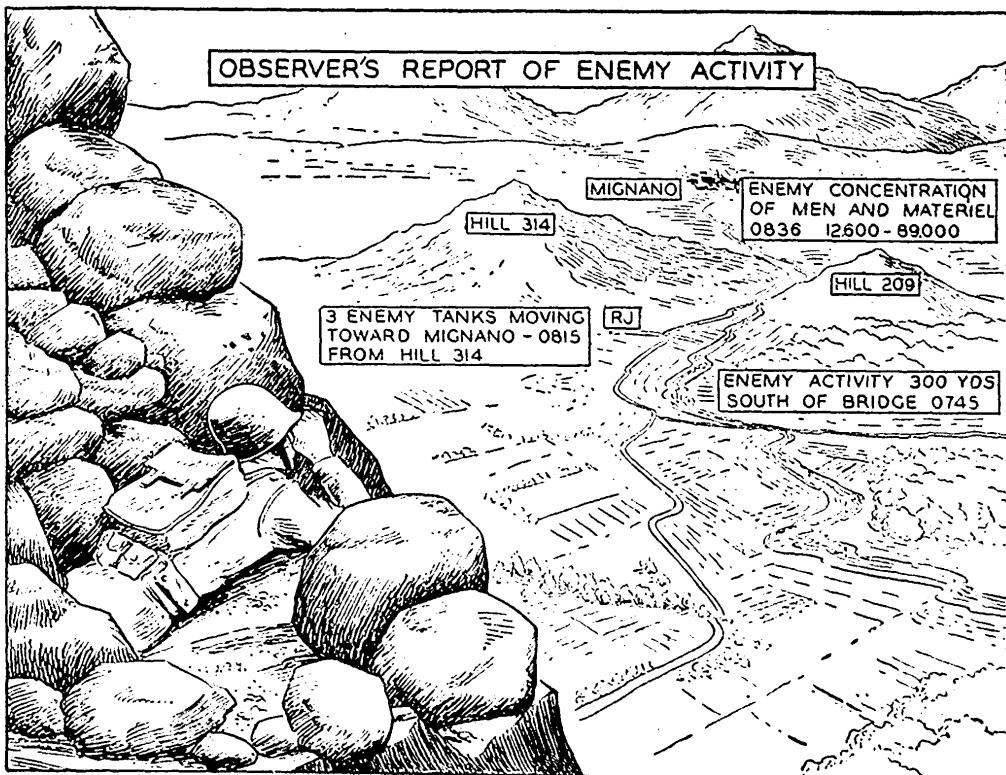


Figure 9. Observer reports what he sees as he sees it.

**6. OBSERVER'S REPORTS.** As he makes an observation, the observer reports what he sees directly to the battalion fire-direction center or to the battery (fig. 9). He should not be required to make written reports except when he is out of communication with the battalion headquarters or battery. Fires are recorded on his panoramic sketch. His reports are recorded at the fire-direction center. These oral reports have the advantage that the observer is able to concentrate his attention upon the area being observed; he is able to give a continuous description of enemy action; and speedy dissemination of information is obtained. The observer reports all activity observed, including the following:

- a. Nature of activity observed.
- b. Location of activity: by coordinates, with respect to a numbered concentration, or by direction and distance from a reference point.
- c. Number of units: individuals, vehicles, tanks, etc.
- d. Direction and speed of movement.
- e. Whether or not he desires fire on the targets. He reports exactly what he observes and not what he infers or deduces from his observation. A forward observer, in addition, reports the location and movement of friendly forward elements due regard being taken for the security of such information. During intervals when no activity is observed, he makes periodic negative reports.
- f. He reports on the effect obtained from prearranged fires when visibility permits. In order to accomplish this, he should be furnished the location and schedule of prearranged fires.

**7. CHECK LIST FOR OBSERVER.** A helpful check list is included for the senior observer at the observation post:

Can I go to the observation post at night or in fog and rain?  
Do I know personal navigation?

Are there at least three of us here?  
Am I keeping the zone of observation under constant surveillance?

When action is imminent, will I have as many eyes watching as possible? Is the radio properly manned during these phases?

Do I need a written record of activities? If so, has someone been assigned to act as recorder?

Have I made arrangements for rest and relief of my observers?  
Am I located on the map? Do I have it oriented?

Have I asked for oblique photographs, photomaps, and vertical air photos?

Have I selected and prepared an alternate observation post?

Have I made a panoramic sketch of my zone of observation?

Have I included on this sketch all concentrations, targets of opportunity, and data for these targets?

Where is the base point? Are all the concentrations and check points identified? If not, immediate steps should be taken to "shoot in" the target area by registering on several check points. Am I restricted on opening fire?

Where are the front lines, our patrol and reconnaissance elements?

Do I have all my instruments? Are they "zeroed" and oriented so that I can work at night?

Is my camouflage perfect or can I improve it?

Do I have plenty of rations and water? Where are my first-aid facilities? Are my men as comfortable as possible? If it rains, am I ready? Do I have a waterproof top, boards on the floor, and a sump hole for drainage?

Is my security sufficient? Have I taken precautions to prevent surprise attacks?

Does the supported unit know my location? Have I run wires to their communication? Can they help with my security? Will they report to me any targets they see?

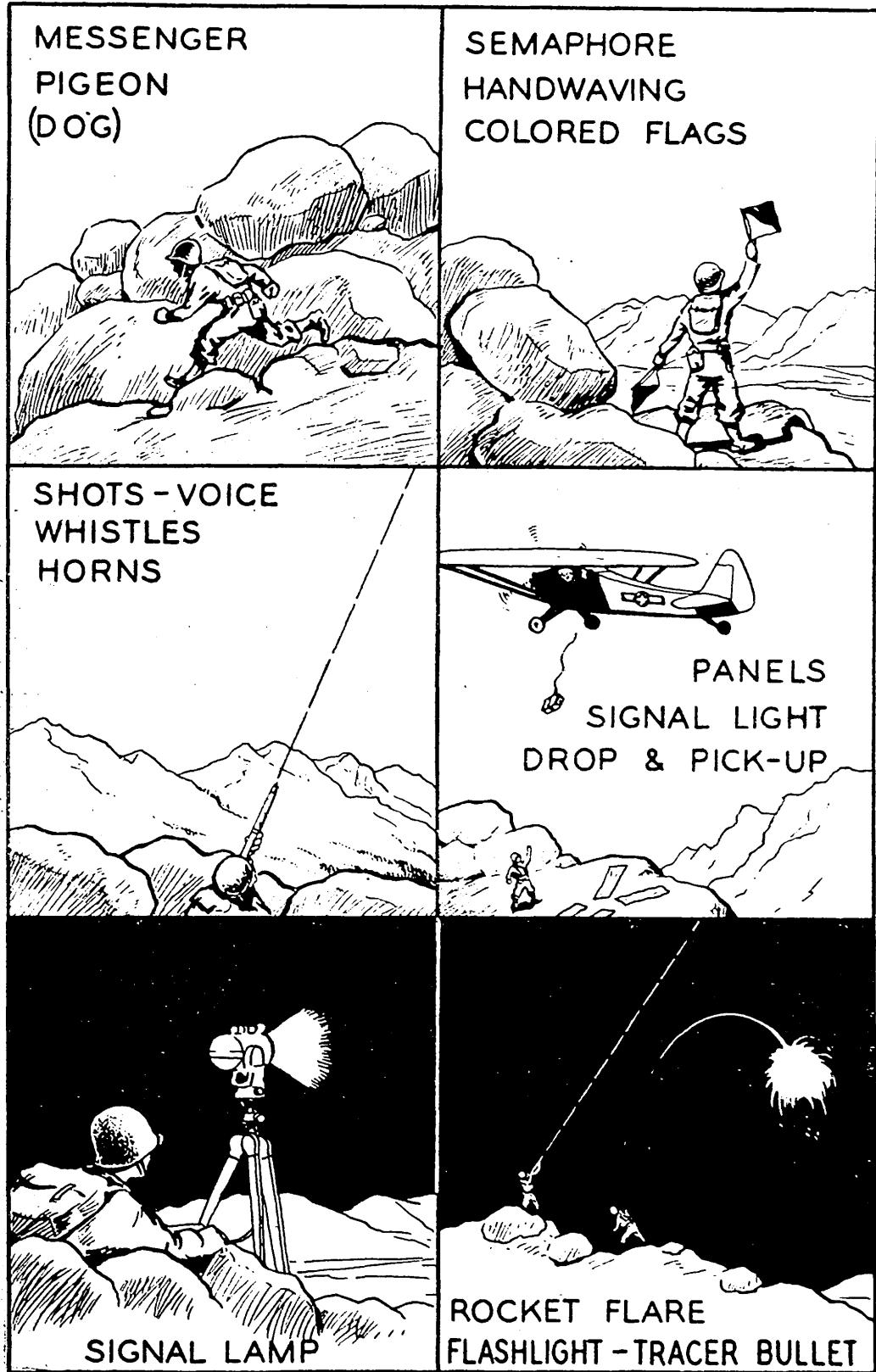
Have I reported all enemy activity and friendly dispositions exactly as they are without giving anything away over the radio?

Is that a good target for artillery, or could the infantry handle it better with mortars or rifles? Does the infantry have the ammunition to do the job and can the infantry be resupplied as readily as the artillery?

What type of fire do I need for that target—percussion, ricochet, time, or smoke?

Is that target so small and immobile that the sheaf should be converged? Is it so close to our own troops that guns must be corrected for displacement in depth?

Have I established and tested all possible means of communication? (See fig. 10.)



*Figure 10. Alternate methods of communication.*

If I cannot get communication, could I move my radio or put up a long wire antenna?

Have I my flare gun, rocket launcher, aiming circle, flashlight, compass, map board, air photo, pyrotechnic code, pre-arranged message code, map coordinate template, weapons, plenty of ammunition, and hand grenades?

Do I have plenty of spare batteries? Some batteries will last 2 hours; others will last indefinitely.

Is my section properly trained and instructed to carry on even if I am lost?

Do I know how to deal with mine fields?

### Section III. FORWARD OBSERVATION

**8. GENERAL.** a. A forward observer is assigned to observe and conduct fires in the zone of action of a given unit and to maintain contact with that unit. From his post up forward he can distinguish friend from foe and can adjust fire in close support of friendly troops.

b. The artillery forward observer is potentially the most powerful individual in the forward area. Other officers control and maneuver the fire power of platoons or companies, but the forward observer may control and direct the sledge-hammer power of all the artillery within range. Supported-unit commanders realize this and are quick to nurture and protect the artillery observer and his party. Therefore, the best qualified officers available should be detailed as forward observers.

c. The primary mission of the forward observer is to watch the movements of the supported unit and to adjust artillery fire on those hostile elements which interfere with the mission of that unit. He accomplishes this through surveillance and correction of prearranged fires, and by adjusting fire on targets of opportunity which he observes or which are identified to him by others. He must closely follow the leading elements to the objective and immediately arrange for protective fires to stop enemy counterattacks. His point of observation should be on commanding ground from which he can observe any hostile action. He must be able to see any hostile attempt at envelopment or flanking action.

d. The secondary mission of the observer is to keep the

artillery battalion informed of the situation as to all enemy activity and dispositions, and of the location of our own troops.

e. Forward observers of combat team or direct support artillery battalions and of reinforcing artillery battalions are coordinated and controlled by direct support artillery commander through his liaison officers with the infantry battalion commanders. An officer detailed as forward observer from any artillery unit reports to the direct support artillery battalion liaison officer with the infantry battalion in the zone in which the forward observer expects to observe. The liaison officer must familiarize the forward observer with the local situation and assign to him the mission of observing for a specific infantry unit, usually a company.

f. The forward observer is not attached to the infantry unit for which he is observing; he goes where he can best accomplish his mission. He must keep the commander of the infantry unit in whose zone he is operating or for whom he is observing informed of his location. Likewise the infantry commander must keep the forward observer informed of his locations and dispositions. The forward observer and the supported infantry commander are mutually responsible that the necessary contact and liaison are maintained.

g. Infantry company officers should know at all times how and where to get artillery support. Infantry company officers and artillery forward observers must familiarize themselves with each other's problems.

h. The forward observer is assisted by a small party consisting of a noncommissioned officer and a radio operator. The observer and his party should be fully equipped to carry out the mission. This equipment includes transportation, means of communication, field glasses, copies of appropriate maps and air photos, and prearranged message codes. Any information of value to the enemy appearing on maps, charts, or photos should be such that it can be readily destroyed. The individual intrenching tools, rations, weapons, and equipment should be taken.

**9. PROCEDURE OF FORWARD OBSERVER.** a. As soon as he is designated, a forward observer will obtain, check, and load his equipment in his assigned vehicle as follows:

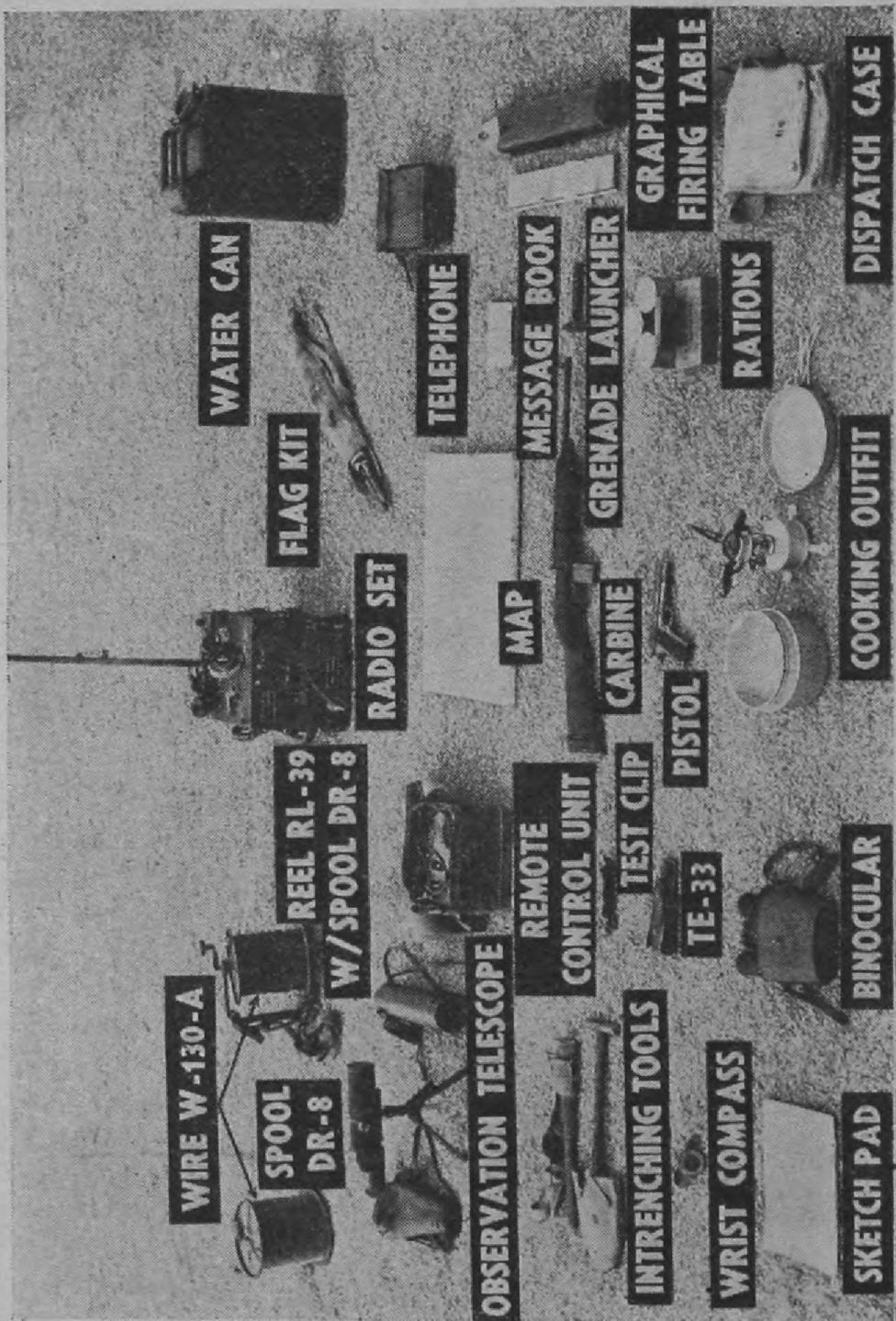


Figure II. Forward observer equipment.

- (1) Vehicle equipment.
- (2) Party personnel and their equipment.
- (3) Radio and telephone equipment.
- (4) Maps, photos, codes, pads, pencils, pins, and message books.
- (5) Field glasses, compass, graphical firing table, intrenching tools, rations, and pyrotechnic signaling equipment.
- (6) Extra equipment such as water can (filled), extra batteries, and replacement radios and telephones if available. Empty sandbags and a first-aid kit are desirable (figs. 11 and 12).



Figure 12. Forward observer party loaded and mounted on  $\frac{1}{4}$ -ton truck.

b. Before going forward, the observer obtains information pertaining to—

- (1) The situation.
- (2) The location of the command post of the supported battalion, and general locations of other units in that sector.
- (3) The location of his own unit, the location and amount of reinforcing artillery available to his own unit if this information is available.
- (4) *The location of the base point, check and index points,*

*concentrations and their numbers, and any special fires that are planned.* Only the italicized items may be recorded or placed on a map or map substitute.

(5) The pyrotechnic codes, prearranged message codes, and map coordinate templates.

(6) The arrangements made to maintain communication, to include duplication and even triplication of communication facilities if possible.

(7) The location of his own batteries.

(8) Any instructions relative to displacement.

c. On the way to the supported unit the observer makes notes of terrain features and the location of observation, fields of fire, concealment and cover, obstacles, and communication routes. He notices the position of installations so that he will have an idea of what is behind him and can answer any questions which may be asked when he reaches the command post of the supported unit. He has his men memorize the route in case they must return for rations or replacements (fig. 13).

d. Upon arrival at the command post of the supported unit, the forward observer reports to the liaison officer of his battalion who is at the infantry or supported unit command post and gets the following information:

(1) The situation and scheme of maneuver of the supported unit, including the location and plans for the employment of the heavy weapons and infantry cannon. He should work very closely with the cannon and mortar platoons belonging to the supported unit which his artillery unit is supporting.

(2) The location of the unit with which he is to work.

(3) Other information listed in b above that was not available at the time he left his organization.

e. Upon arrival in the forward area, the observer—

(1) Contacts the commander of the unit with which he is to work and ascertains the unit's dispositions and scheme of maneuver. Arranges for rations and locates the aid man. He explains to supported troops the capabilities and limitations of his battalion and brings out the fact that any members of the supported arm can help him adjust fire on any targets of opportunity which they see. He talks to the infantry about this and indicates any check points or reference points which infantry-men can use in calling for fire, and how this fire can best be

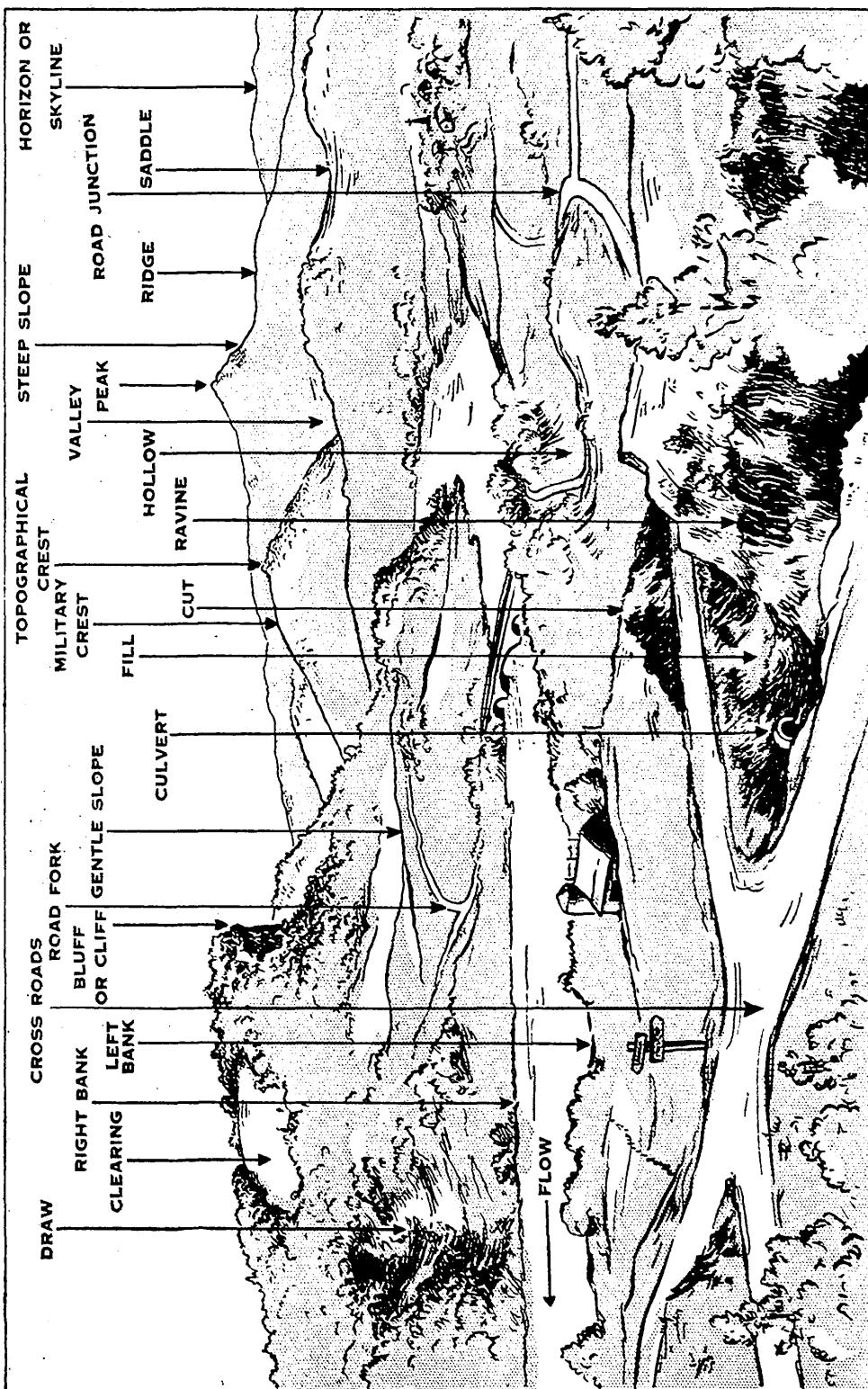


Figure 13. Terrain check list.

accomplished. He prepares to exploit all of their communication facilities in case his own fail.

(2) "Shoots himself in" by registering on one or more check points or the base point if registration is not restricted.

(3) Arranges with the supported-unit commander to keep him informed of changes in the supported unit's plans and dispositions.

(4) Contacts the observers or commanders of heavy weapons and infantry cannon operating in his vicinity and arranges for coordination of fires, when time and the situation permit.

(5) Selects an observation post from which he can observe the action of the unit. Plans an axis of advance based on the scheme of maneuver of the organization with which he is working.

(6) Informs the supported organization of his location and plans.

(7) Reports to his battalion or battery—

(a) His location and field of observation.

(b) The location of our own troops and changes in their dispositions. When patrol or reconnaissance elements move forward, he will inform battalion fire-direction center.

(c) All hostile dispositions and movements, and their exact nature (including aircraft warning).

(8) Watches the movement of the supported troops.

(9) Observes and adjusts fire and reports the results of fire. Makes periodic negative reports during intervals when no activity is observed.

(10) Improves his observation post as to cover, camouflage, and field of observation as time allows.

(11) Plans and installs alternate communications and alternate observation posts (fig. 14).

(12) Begins a sketch or panoramic sketch of the area to his front, recording thereon the base point, index points, concentrations, and check points (figs. 15 and 16). Makes copies of this panoramic sketch and distributes them to the front line platoon commanders so that they will know the numbers and locations of concentrations and be able to call for them in case the forward observer is neutralized. He may also use an oblique or vertical photo if available (figs. 17 and 18).

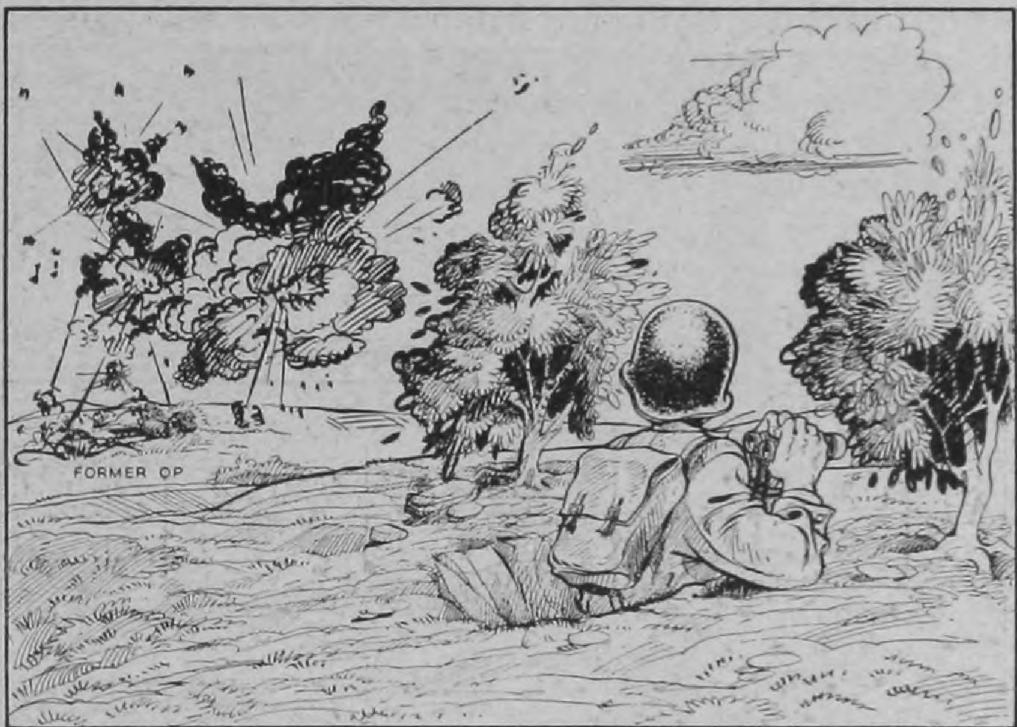


Figure 14. Install alternate observation posts.



Figure 15. Terrain as seen by forward observer.

600885°—44——4

21

(13) Stays out of the fire fight and gets on the windward flank of the attack.

f. As time permits, the observer will improve—

- (1) Communications.
- (2) Camouflage.
- (3) Cover.
- (4) Comfort.
- (5) Security.

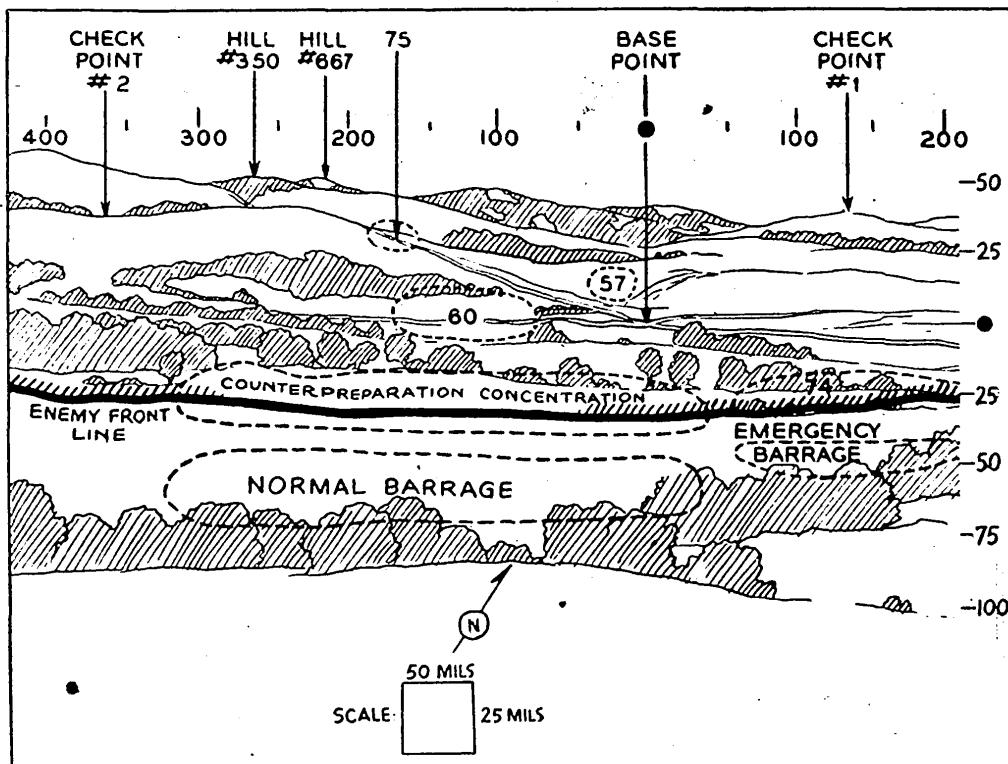


Figure 16. Panoramic sketch made by forward observer.

g. The observer will use the type of conveyance best suited to the unit with which he is working. If he is working with infantry, often he will be on foot. If he is working with tanks, his transportation may be a tank. A  $\frac{1}{4}$ -ton truck is usually the best transportation for forward observation parties.

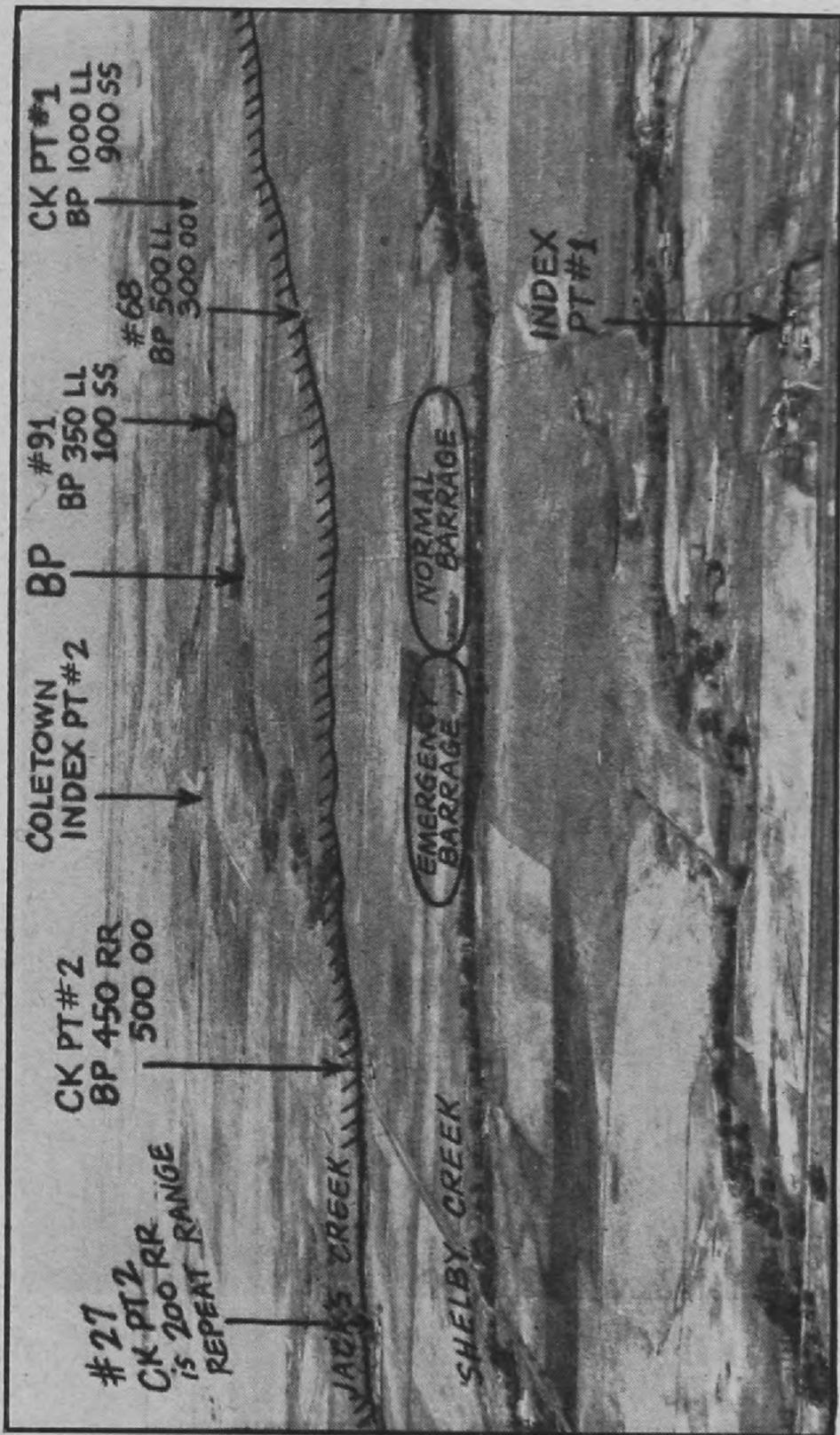


Figure 17. Oblique photo as used by forward observer.



Figure 18. Vertical air photo as used by the forward observer.

**10. COMMUNICATION.** **a. General.** Employment of communication by forward observers of field artillery units varies, depending upon the type of division. The forward observer must have a thorough knowledge and clear understanding of his primary means of communication and also of all alternate means (fig. 10). He must also know the means of employment of all communication of the supported unit. He must be aggressive in maintaining communication with his unit. A forward observer without communication is of no value either to his own or to his supported unit. Radio is the normal means of communication in a rapidly moving situation. However wire and telephones should be installed as soon as the situation permits.

**b. Wire communication.** (1) In the infantry division artillery, battalions assigned direct support missions maintain wire communication with liaison officers and forward observers who are with the committed infantry battalions and front line companies. The basic wire system of a direct support artillery battalion includes a wire circuit from the artillery battalion switchboard to each liaison officer. Forward observers in the zone of action of the supported infantry maintain a wire circuit to the liaison officer at the infantry battalion command post. A circuit is spliced into the liaison officer's circuit, forming a party line which facilitates coordination of the advance elements. By means of this system, fire missions and intelligence reports are sent to the artillery battalion fire-direction center.

(2) In a cavalry division, the employment of artillery forward observers and liaison officers is comparable to their employment in an infantry division.

(3) Battalions of armored division artillery and airborne division artillery normally do not maintain wire communication with forward observers.

**c. Radio.** (1) In the infantry division artillery, each forward observer and liaison officer of direct support units is provided with a radio set. These sets are preset to operate on the battalion fire direction and control channels A and B. Direct communication is maintained between the forward observers and base sets at fire-direction center or battery on primary channel A, or in case of necessity, on the alternate

channel B. Forward observers of airborne and cavalry division artillery units are provided with equipment identical to that in the infantry division artillery, and employ the same system of communication between the forward observers and fire-direction centers.

(2) In armored units, forward observers are provided with radio sets, and operate with their fire-direction center or battery sets. Each of these latter sets is preset to operate on ten channels, of which a maximum of four are allotted for operation of the fire direction net.

d. **Special situations.** (1) *Motorized artillery in support of armored artillery.* (a) When motorized artillery is employed in support of armored artillery, the armored artillery battalion radio nets continue normal operation. The motorized unit should send two radio sets, together with a liaison officer, to the fire-direction center of the armored unit. These sets will be preset to operate on the regularly assigned channels of the motorized unit. The armored unit, in turn, should send one radio set and a liaison officer to the fire-direction center of the motorized unit. This set must be preset for operation on the assigned channels of the armored unit. All forward observers of the motorized and armored units report missions to the armored fire-direction center, where the decision is made as to which unit is best capable of firing the mission. When fire missions are reported by one of the above mentioned observers, and the decision is made to use the motorized artillery to fire, a message is sent by the liaison officer (motorized) notifying his fire-direction center of the decision. The mission is then handled by the forward observer through his base set, and when necessary, through the set of the appropriate liaison officer. The same general procedure applies for control of fires in case armored artillery is in support of motorized artillery.

(b) During displacement of the armored field artillery battalion, the armored field artillery normally uses a radio set at the fire-direction center of the motorized artillery battalion to provide communication between the armored artillery forward observers and the motorized artillery fire-direction center. Radio sets and the liaison officer of the motorized battalion should displace with the armored artillery and provide com-

munication between the forward observers of the motorized artillery and the fire-direction center of the armored artillery during the displacement of the motorized artillery.

(2) *Truck-drawn artillery in support of tanks.* Conduct of fire in support of a tank attack will be almost entirely by forward observers in tanks furnished by the supported tank unit. The forward observers should accompany the leading elements and *must* have communication with the tank commanders and the artillery fire-direction center. The tank is equipped with a 500-series radio set. Communication with the tank battalion and company commander will be on the unit's normal channel for command or fire control, and presents no problem. Communication with the artillery fire-direction center may be obtained in one of several ways.

(a) The tank unit may provide a 500-series set to remain at the artillery fire-direction center. Communication is then direct between the artillery observer's tank set and the tank unit's set at the fire-direction center. Fire commands to the batteries are sent over the artillery battalion's normal fire-direction channels.

(b) If the tank provided for the forward observer is provided with an SCR-508 radio set and a spare channel is available, the spare channel can be used for the adjustment of fire. This requires that the forward observer's radio set and the SCR-508 or SCR-510 at the fire-direction center be tuned to the spare channel. The second receiver of the observer's set would be tuned to the tank unit's command frequency. Fire commands to the batteries are handled as in (a) above.

**11. HINTS FOR FORWARD OBSERVER.** One of the most important skills in forward observation is map and photograph reading.

The use of the compass is doubly important to the forward observer because he must be able to orient his map and know his own location at all times.

Antipersonnel and antitank mines are a problem confronted by most observers.

Don't look like a forward observer. Look like an infantry soldier. Use camouflage clothes and every other possible means to prevent detection.

Work out fire plans so that the entire section and the members of the supported unit know just what to do in an emergency.

Dig fox holes deep and back under the reverse slope. Keep your equipment, rations, communication, and other vital installations there. Dig a connecting communication trench if possible.

Know when and where patrols go so that they will not be fired upon.

Always know the location of friendly forward elements.

Hostile guns which open up on the attacking force, especially antitank guns, are usually in the second line of defense. The close-up guns wait for an easy killing shot. Look closely for these close-up guns.

Know how to identify all enemy equipment even though you may see only a portion of it, such as guns, tanks, anti-tank guns, observation post equipment, etc.

Close scrutiny of the target area is vital.

Prompt and proper treatment of wounds will avoid shock, the real killer on the battlefield. Know the location of the infantry first-aid post.

Don't stop and dig a trench when you should be moving.

Personal reconnaissance is better than any map for planning forward movement. If reconnaissance is impossible, the careful study of air photographs will aid in planning movement.

In order to carry out your primary mission, stay out of the fire fight and don't get too interested in one spot—something may be going on somewhere else.

Extra burlap bags will come in handy in organizing your observation post.

Use every pair of eyes in the supported unit to observe and designate targets.

## CHAPTER 2

# ADJUSTMENT OF ARTILLERY FIRES BY FORWARD OBSERVERS

---

### Section I. GENERAL

**12. GENERAL.** The procedure described in this chapter is usually appropriate for the use of forward observers. Factors which enter into a decision to use the following procedure (forward observer method) or other procedure for example, axial or lateral methods as described in FM 6-40 are:

- a. Factors favoring method of conduct of fire using sensings in yards (forward observation methods) as opposed to method of commands using axial or lateral technique of conduct of fire.
  - (1) Relatively short observer-target range.
  - (2) Small observer displacement from gun target line.
  - (3) Difference in elevation between observer and target great enough to afford observer a good over-all view of the terrain around the target.
  - (4) Terrain around the target uniform in contour and having the minimum of heavy woods in the vicinity of the target.
  - (5) Terrain around target level or having uniform and easy slopes.
  - (6) Relative location of guns and target unknown.
  - (7) Axial or lateral technique of conduct of fire unknown to observer.
  - (8) Difficulties and security requirements of radio communication may necessitate use of forward observation methods.
- b. Factors unfavorable to conduct of fire using method of sensings (forward observation methods).
  - (1) Relatively long observer-target range, over 1,500 to 2,000 yards depending on visibility.
  - (2) Large observer displacement from gun target line.

(3) Lack of over-all view of terrain around target, observer and target at approximately same elevation.

(4) Rough terrain in vicinity of target.

(5) Steep slopes across the direction of fire in vicinity of target.

c. The method of adjustment most appropriate to the situation should be used. When the situation is decidedly unfavorable for using forward observation methods, a more suitable method should be used. Adjustment by forward observation methods when the observer displacement is great should be undertaken with caution especially when the target is near our own troops.

d. Instruments and plotting equipment facilitate adjustment regardless of the methods used. However, forward observation methods (sensing in yards) may be used without instruments or firing tables.

e. The principles of bracketing both range and deflection apply in forward observation methods. The observer must visualize the piece-target line, and consider the observer displacement (target offset). The observer must learn to coordinate the range and deflection sensing. When one element range or deflection is greatly in error, the other should usually be treated as doubtful and no change made.

f. The use of standard phrases between the forward observer and the battery or fire-direction center facilitates mutual understanding and reduces the volume of communication. However, the observer is not confined to the use of stereotyped phrases. It is frequently desirable to supplement the standard phrases with information or requests in words which convey just what the observer sees or wants.

## Section II. NONARTILLERY OBSERVERS

**13. GENERAL METHOD.** Fire can be adjusted by forward observers by any one of the various means appropriate. Frequently an observer who is not familiar with these various methods locates a target. In this case, he can adjust as follows:

a. He reports the location of the target by coordinates or, by stating that a base point, check point, bridge, or well-defined

terrain feature is, in his opinion, so many yards right (left), so many yards above (below) and so many yards over (short) the target on which he desires fire. These directions are given with reference to what the observer believes to be the general direction of the line of fire of the adjusting battery. He also indicates that he can adjust the fire.

*Example:* St. Luke's Church is 200 right, 20 above, 500 short, antitank gun, will adjust.

b. Not knowing the line of fire, he may designate the target in one of the following ways:

*Example:* St. Luke's Church is  $\frac{1}{4}$  mile southeast and 20 yards above antitank gun, will adjust; or CR 824 is 300 yards east, 10 yards below and 100 yards south of antitank gun, will adjust.

c. It should be noted that targets are designated in the same manner as reporting bursts with respect to the target. A new target is designated by assuming a volley has fallen on the known point, (base point, check point, terrain feature, etc.) and then reporting its deviation, in yards, right (left), above (below), over (short) of the target.

d. Example of sensing volley fired during adjustment: 200 right, 20 above, 300 short means that the center of the volley appears to the observer to be 200 yards right of the gun target line (the bursts in the case of time fire) 20 yards above the target, and 300 yards short of the target. For detailed information on sensing, see paragraph 14.

e. When an observer makes an error in sensing, he reports the correct sensing preceded by *corrected sensing*. For example, an observer reported the following sensing during an adjustment: *200 left, 400 short*. The observer desired to change the deflection sensing to 200 right. To correct this error, the observer reports *corrected sensing, 200 right, 400 short*.

f. The artillery unit receiving this message notifies the observer that it will fire a battery or battalion, tells him the number assigned to the concentration so that he will be able to refer to it again, tells him to wait a minute; and when ready, notifies him that Battery C (or other battery) is ready to fire. The observer says "Fire" and looks for the rounds. When he sees them strike, he, not knowing the direction of fire, may in an appropriate case, sense them so many

hundred yards over or short so as to obtain some indication, after the next rounds are fired, as to the direction of fire. He then proceeds to adjust by sensing them right, left, over, or short in hundreds of yards until they are so near his target that he is *certain* that when the battery fires for effect its fire will be placed at the right spot. He must be particularly careful when a battalion is to be fired that his adjustment is correct, not only for range but also for deflection. This is the general method; refinements of it are indicated in paragraph 14.

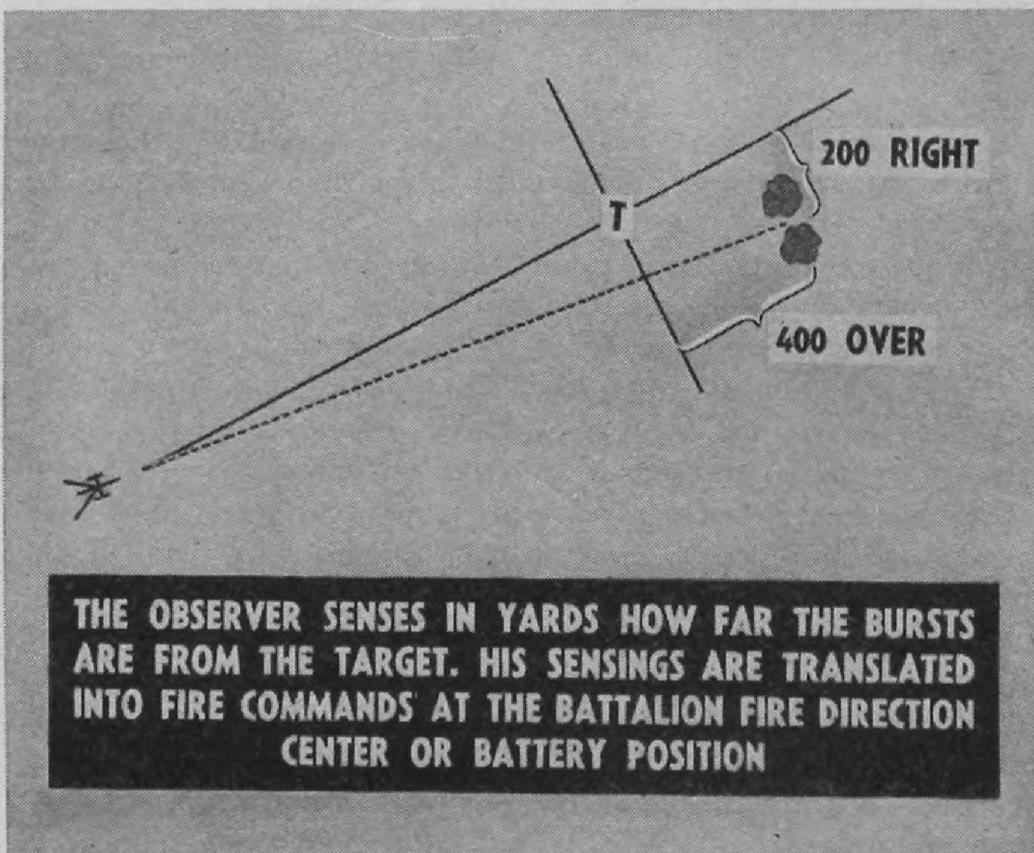


Figure 19. Observer sensings.

**14. HINTS FOR NONARTILLERY OBSERVERS.** a. While many points covered in this manual are refinements and are of value to the experienced observer, the inexperienced observer need not be familiar with all of them. Adherence to certain principles of forward observer methods of adjusting fire will enable anyone who is able to communicate with the

artillery to adjust fire. These principles should be known to officers and noncommissioned officers of supported troops. They are summarized below.

b. (1) *Sensings*, not commands, are used. They are used to report burst locations and new target locations with respect to a known point, base point, check point or located terrain feature. The sensing is always with respect to the target and is in yards; "400 right" means that the burst is 400 yards right of the target. "RJ 240 is 400 short" means that RJ 240 is 400 yards short of the target.

(2) Sensings are based on the line from the artillery position area to the target (gun-target line) (figs. 19 and 20). The approximate direction of this line can be determined by two volleys differing in range only, or less accurately, by two volleys differing in deflection only. In the latter case, the line is perpendicular to a line connecting these two volleys. Sensings are in three dimensions: right or left, above or below, short or over. Except with time fire, sensing of above or below is not important and may be omitted. With time fire, it is used in the initial target designation, and need not be repeated. However, see (6) below.

(3) Targets can be designated by any method that will result in a round or volley visible to the observer. An observer having no map and no method of indicating a known terrain feature can request, "Mark center of sector." A request such as, "I am at the position formerly occupied by Battery C's forward observer; fire a round that I can see" is entirely appropriate. The initial round is sensed with respect to the target, and the adjustment proceeds.

(4) Target designation must include—

- (a) Location of target.
- (b) Nature of target.

(c) Whether or not an adjustment is necessary, or whether or not the location of the target is sufficiently accurate to justify fire for effect. Unless the target location is correct to within 50 yards, the observer states, "Will adjust." The request "Fire for effect" indicates a target located on an accurate map or map substitute, and no adjustment need be made. The effect of the fire should be reported as soon as possible.

(5) During adjustment, the observer is given those changes

that he calls for. If deflection is not sensed, it will not be changed. Range, however, *must* be sensed, "Repeat range" being appropriate if no change is desired. The observer must remember to request fire for effect when the adjustment reaches a point where subsequent fire will be effective.

(6) Time fire is difficult for an inexperienced observer to adjust. If it is used, each volley should be sensed "air" if all rounds burst in the air, "graze" if all rounds burst on the

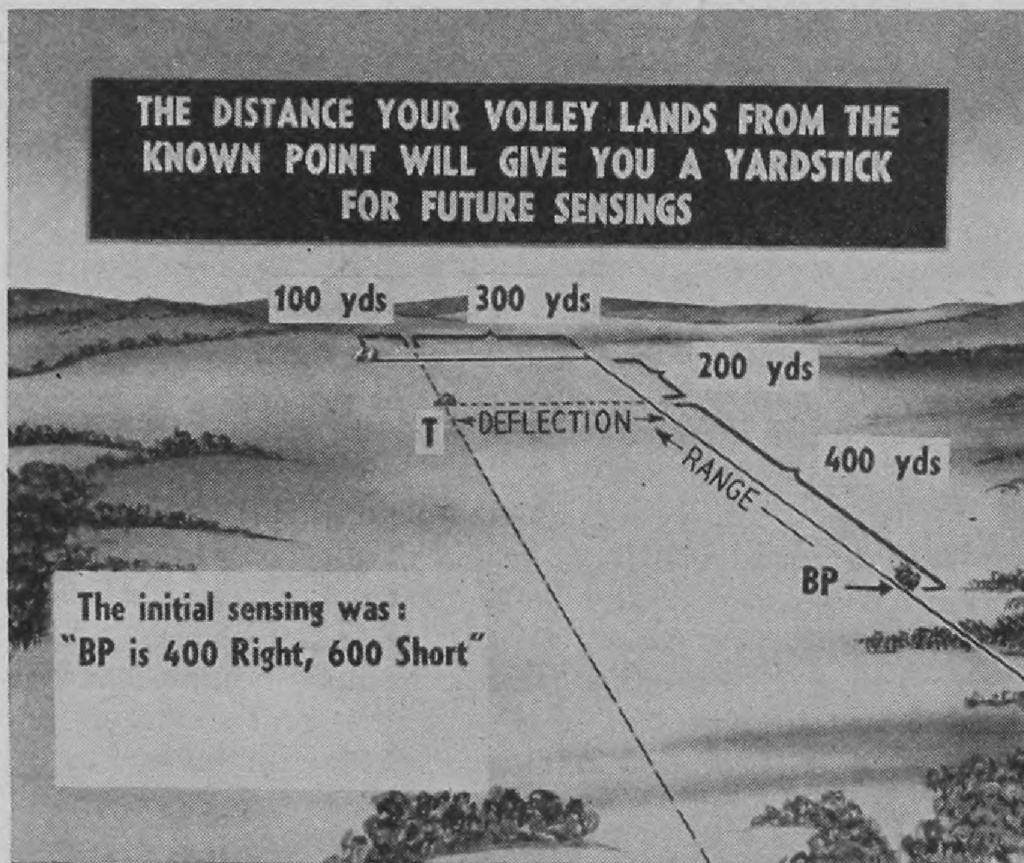


Figure 20. Use of prior sensings as yardstick for future sensings.

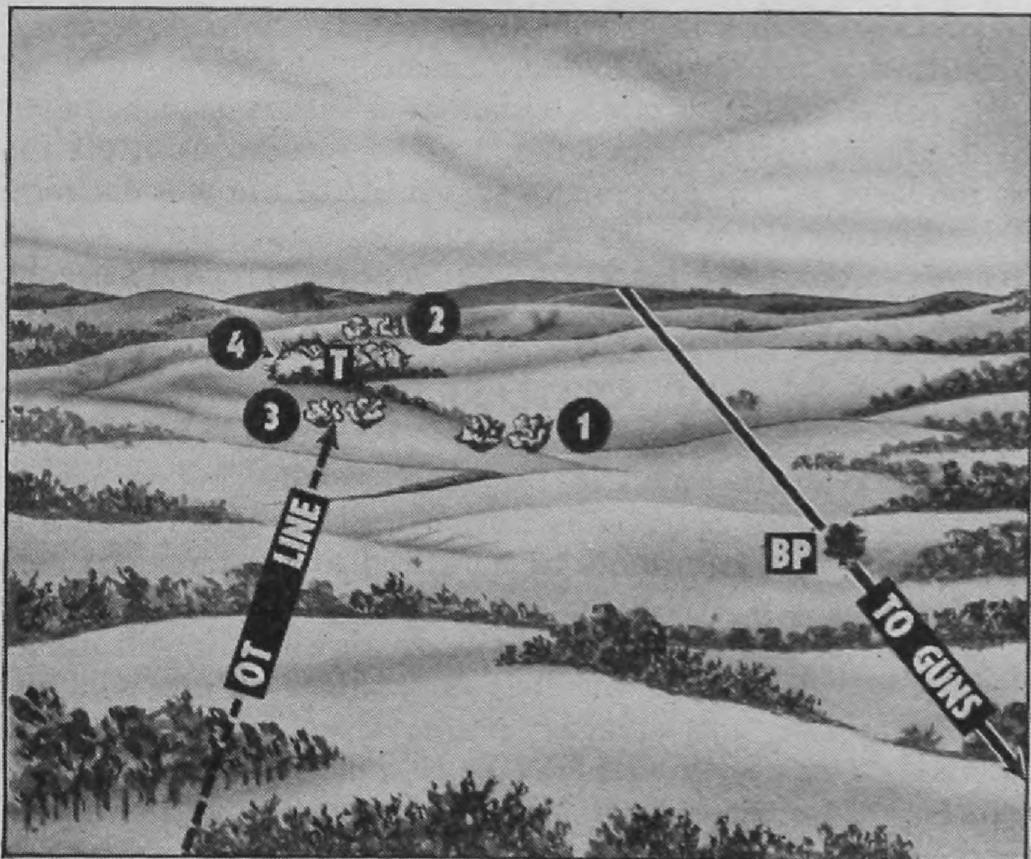
ground, or "mixed" if some are in the air and some on the ground. If this simple rule is adhered to, effective time fire will result.

(7) Standard procedure is of minor importance. Proper procedure or terminology should be used, but a plain statement of circumstances will suffice. For example, "The target is a quarter-mile right of those last rounds but they are so high I can't tell whether they are short or over" is awkward

to transmit, but will have the same effect as "400 left, high air, repeat range." If terms used in transmission from the fire-direction center are not understood, the observer need only say so, and their meaning will be explained.

c. Understanding of a few basic principles applicable to artillery fire will assist the inexperienced observer. These principles are:

(1) Bracket the target. The human eye has a tendency to underestimate distances at long ranges. Many adjustments fail because the observer believes his rounds are very close to the target, and goes into fire for effect without verification. If shorts are sensed at one range and overs at another and



Initial sensing:

"BP is 200 right, 400 short"

- ① Sense first salvo: "400 short"
- ② Sense second salvo: "100 right, 200 over"
- ③ Sense third salvo: "50 left, 100 short, fire for effect"
- ④ Fire for effect covers target.

Figure 21. Keep shots on or near the line from observer to target.

these ranges differ by not over 200 yards, subsequent fire started at the center of this bracket will be effective unless the mission is destruction. Make bold estimates, *unless over-correction will endanger friendly troops*. When a volley is sensed over (short) for range, give a sensing in yards great enough to surely obtain a short (over) in range on the next volley. This is continued until close enough to target to call for fire for effect. The same procedure is followed for deflection.

(2) Keep shots on or near the line from observer to target (observer-target line) (fig. 21). Sensings based on such rounds can usually be taken with the assurance that they are correct. Sensings taken on rounds far from the observer-target line often are erroneous. If rounds cannot be sensed surely, give a sensing which will move the rounds to the observer-target line; then proceed with the adjustment.

(3) The firing for effect, either by a battery or a battalion, will usually cover an area roughly 200 yards square. If this is too large for the purpose, or if part of the fire will endanger friendly troops, say so before calling for fire for effect. "Center range only; fire for effect" or "Converged sheaf; fire for effect" are examples of this procedure.

### Section III. ARTILLERY OBSERVERS

**15. GENERAL.** a. The paragraphs which follow assume that the forward observer is truly a forward observer, that is, the observer-target distance as compared to gun-target range is relatively short. When observer-target distance approaches 1,500 to 2,000 yards, depending upon visibility, it will usually be found that normal methods of conduct of fire will give more accurate and quicker results than forward observer methods (sensing in yards). It is difficult to estimate distances when observer-target distance is considerable and normal bracketing is preferable to guessing at number of yards short or over; the mil scale in field glass or BC scope is a much more accurate means of determining deflection error than estimating yards by eye. This is particularly true in any precision adjustment. Adjustment of heavy artillery, especially on missions requiring precision, by forward observer methods should be exceptional. Normal methods of adjustment will usually be

the most effective at long ranges and in making precision adjustments.

The artillery forward observer is one unit in a coordinated system of observation which is planned by artillery battalions and higher units. He is assigned to observe for a specific supported unit, and is sent forward as early as possible. He is furnished the available maps and map substitutes, including any special maps used by the supported troops. He obtains such information as may be available on the situation, locations of supported and supporting troops, base points, check points, and special fires planned before leaving the position area. (See par. 9b.)

## 16. TARGET DESIGNATION AND REQUEST FOR FIRE.

a. The target designation and the request for fire include—

- (1) Location of target.
- (2) Nature of target.
- (3) Nature of adjustment deemed appropriate.

b. Location of target may be given in one of the following ways:

(1) Grid coordinates referring to map, photomap, template, or vertical or oblique photograph.

(2) A known point is sensed (with reference to the target) as so many yards left or right, above or below, and short or over the target (fig. 19); for example: *Base point is 400 left, 30 below, 200 short.* The known point may be base point, check point, target previously fired on, concentration, index point, center of impact, high burst, rocket, or other point known to both observer and battery or battalion fire-direction center. The deflection and range sensings are given in whole hundreds of yards, and are made large enough to assure bracketing the target between the known point (point used for reference) and the first volley, except where fires are close to friendly troops.

(3) The observer may request a marking volley; for example—

*Mark base point.*

*Mark check point No. 3.*

*Mark code compass plus 300, code range plus 1000 (pre-arranged code only).*

*Mark center of sector, high air* (appropriate when the relative location of pieces and front lines is not known; the high air is to avoid casualties among friendly troops).

c. The report on the nature of the target consists of a description of the enemy installation, personnel, equipment, or activity observed. It should be brief to avoid delaying fire. It should contain enough information to be a guide as to the importance of the target and whether or not the target should be taken under fire. All other information which might be of value to intelligence agencies is reported at such times as will not delay opening and adjustment of fire.

d. The nature of the adjustment may include *crest adjustment; auxiliary target; precision registration; destruction; center range only; 100-yard bracket, request battalion; request ladder (smoke)\*; request (all possible) additional fire; request converged sheaf; request uniform sheaf and range correction; request high-angle fire; or request time fire.* (*Center range only* is appropriate when the target is of little depth or is so close to friendly troops that they would be endangered by fire in depth.) It will include one of the following:

(1) *Will adjust.* This indicates that the chart location is not accurate and the observer will report sensings by means of which fire can be adjusted. When the observer is not yet in position to observe, or when observation is especially difficult, he may add *at my command.* When he wishes to remove the restriction *at my command*, he follows a sensing with *fire.*

(2) *Fire for effect.* This indicates that the reported target location is considered accurate. In this case, the observer reports the effectiveness or error of the first volley, and later rounds may be corrected accordingly.

(3) *Observation impossible.*

---

\*The ladder is useful both as a means of quick visualization of gun-target line and affording opportunity of a range sensing in one salvo, but is to be used with caution in certain technical situations, as where the enemy is strong in artillery, because it gives the hostile observer a direction line pointing back to the battery firing.

**17. REPORTS TO OBSERVER.** a. The fire-direction center, on receiving a request for fire, notifies the observer, "WAIT." Subsequently the observer is notified of the appropriate portions of the following:

- (1) Projectile, fuze.
- (2) Target number.
- (3) Unit(s) to fire.
- (4) Adjusting battery.
- (5) Method of fire and range spread.
- (6) Time of opening fire.

*Example:* TIME FIRE, CONCENTRATION 27, BATTALION, ABLE, 3 VOLLEYS,  $\frac{1}{2}$  c APART, WHEN READY. If the mission cannot be fired, the observer is notified, "WILL NOT FIRE."

b. When fire is *at my command*, the observer is informed when BATTERY IS READY. He is informed ON THE WAY as each volley is fired during adjustment. As each unit enters fire for effect, the observer is notified for example, "BATTERY CHARLIE FIRING FOR EFFECT," or "BATTALION FIRING FOR EFFECT." Upon completion of fire for effect, the observer is notified "FIRE FOR EFFECT COMPLETED." He is notified of any change in the items in a above which will affect observation or effect.

**18. SENSING, BRACKET FIRE.** a. **Deflection.** In his deflection sensings, the observer reports the distance in yards that the burst center is right or left of the gun-target line. Sensings should be bold in order to bracket the target. No deflection sensing is required if the observer does not want a change in deflection.

b. **Range.** In his range sensings, the observer reports the distance in yards along the gun-target line that the burst center appears short of or beyond the target. Sensings should be bold in order to bracket the target. He may request, "Repeat range" when the range error is doubtful or he does not desire to change the range. When the range is correct, he reports, "Range correct."

c. In sensing deflection and range, the observer generally reports errors in multiples of 100 yards until the error is less than 100 yards (fig. 20) (thereafter, deflection sensings are

reported to the nearest 10 yards and range errors in multiples of 50 yards) or until the adjustment is sufficiently accurate that fire for effect can be started. It may be necessary to split 100 yards in order to place bursts where sensings can be obtained. Sensings should be bold until a bracket has been established. After a bracket has been established, it may be possible to split the bracket proportionately. For example, having sensed the base point *600 short*, and a volley over the target in range is obtained, the observer notes that the target is about one third of the distance (base point-bursts) from the resulting volley. His next range sensing should be *200 over*. Until the observer has visualized the gun-target line, he should sense only one element (deflection or range) of the error of a volley. When the observer displacement angle is appreciably in excess of 300 mils and when there is any doubt as to the gun-target line it is usually advisable to make a range sensing only with a view to getting rounds near the observer-target line, this with a view to obtaining a deflection bracket quickly, just as in large T adjustment. During fire for effect the observer continues to report errors.

- d. (1) If a salvo was not seen because the observer was not in a position to observe, he reports, "Lost, repeat range."  
(2) If a salvo was not seen although the observer was in a position to observe, he reports, "Lost," and gives a sensing which he believes will put the next volley where it can be seen.  
(3) When a ladder has been fired, the observer reports the range sensing of the center round.  
(4) When an observer makes an error in sensing, he reports the correct sensing preceded by "Corrected sensing." For example, an observer reported the following sensing during an adjustment: "200 left, 400 short." The observer desired to change the deflection sensing to 200 right. To correct this error, the observer reports, "Corrected sensing, 200 right, 400 short."
- e. **Fire for effect.** (1) Fire for effect is started when a suitable adjustment has been obtained. A suitable adjustment has been obtained when deflection and range are correct, or when effective fire will result with the next split in bracket.

(Note that fire for effect is not started until range and deflection are correct or a suitable bracket is secured.)

(2) On a mission in which the battalion is to be used, it may be desirable for the forward observer to narrow his bracket to 100 yards or less before calling for fire for effect. The battalion will normally fire at center range unless the observer calls for a special type fire.

(3) On a mission in which a single battery is used, the forward observer usually narrows his bracket to at least 200 yards before calling for fire for effect. Unless otherwise specified, the battery will fire through a 200-yard zone. However, since the observer can see his target, he should call for the type of fire that will eliminate ineffective ranges and rounds. This may be done by calling for "Center range," "100-yard zone," "Sheaf too wide," "Converge sheaf," or by giving a range sensing.

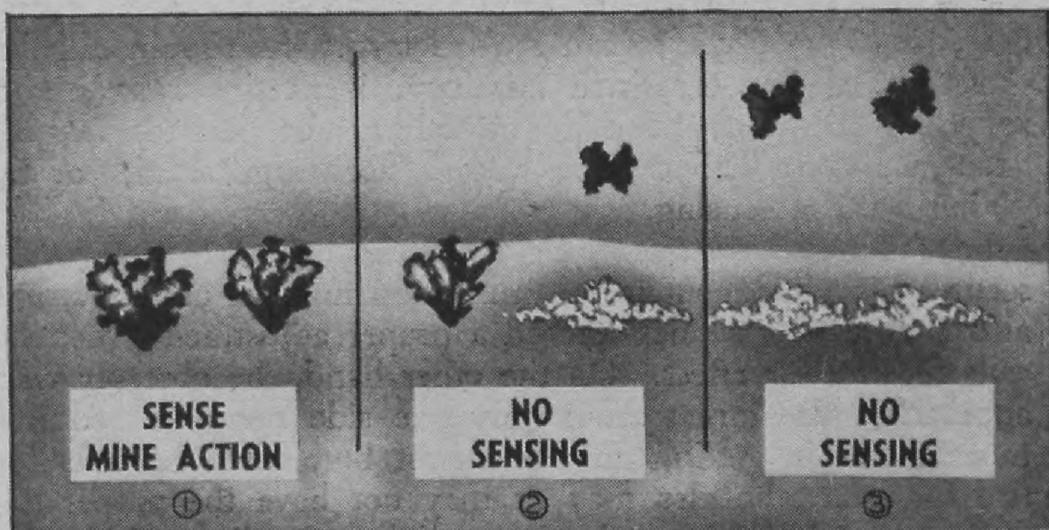
(4) The observer who quickly brackets the target not only secures his adjustment in the minimum number of salvos, but also is sure that he has secured a proper adjustment when he calls for fire for effect. On the other hand, the observer who approaches the target from only one side not only requires more salvos in getting an adjustment but, when he calls for fire for effect, he also may or may not have the proper adjustment and thus may be jeopardizing the lives of the infantrymen who are counting on his adjustment.

f. Ricochet fire (fig. 22). The observer reports, "Mine action" when entering fire for effect, if more than 50 percent of the rounds which established the bracket for fire for effect were mine action. When excessive mine action occurs during fire for effect, the observer reports that fact. (When a shell with delay fuze or with combination fuze set for delay penetrates the earth and detonates below the surface, the round is termed *mine action*. A mine action burst sends up a vertical column of dirt, often with clods of earth, and with little smoke. The explosion is muffled.)

g. Upon completion of fire for effect, the observer reports the effect which he has observed, for example, "10 trucks burning, remainder disappeared to the west," or "Infantry continuing to advance." If it appears desirable, he may request,

"Repeat fire for effect," also giving a sensing or reporting the effect of the previous fire for effect.

h. Time fire (fig. 23). (1) During adjustment, the observer controls height of burst by sensings. The range adjustment preferably is made with air bursts. A good height of burst during adjustment is that which gives range sensings. When the observer wants the bursts raised, he senses *mixed* or *graze* (fig. 24). When he wants the burst lowered, he senses *air* or *high air*. When the height of burst is satisfactory, he makes no height-of-burst sensing (fig. 25).



- ① Bursts occur below ground. No ricochet effect. Sense *mine action*.
- ② 50 percent of rounds ricochet. No sensing required.
- ③ 100 percent of rounds ricochet. No sensing required.

Figure 22. Sensings used when the observer is attempting to obtain effective ricochet fire.

(2) Before requesting fire for effect, the height of burst must be correct or a sensing must be given which will result in the proper height of burst (fig. 26). The observer does not request fire for effect if the last volley was all graze. If the height of burst is correct (20 yards), he makes no height-of-burst sensing. If the height of burst is materially greater or less than 20 yards, the forward observer reports the height above the target, for example, "30 air." The battery or battalion fire-direction center then lowers the height of burst 10 yards. If during the fire for effect the height of burst is materially greater or less than 20 yards, the observer reports

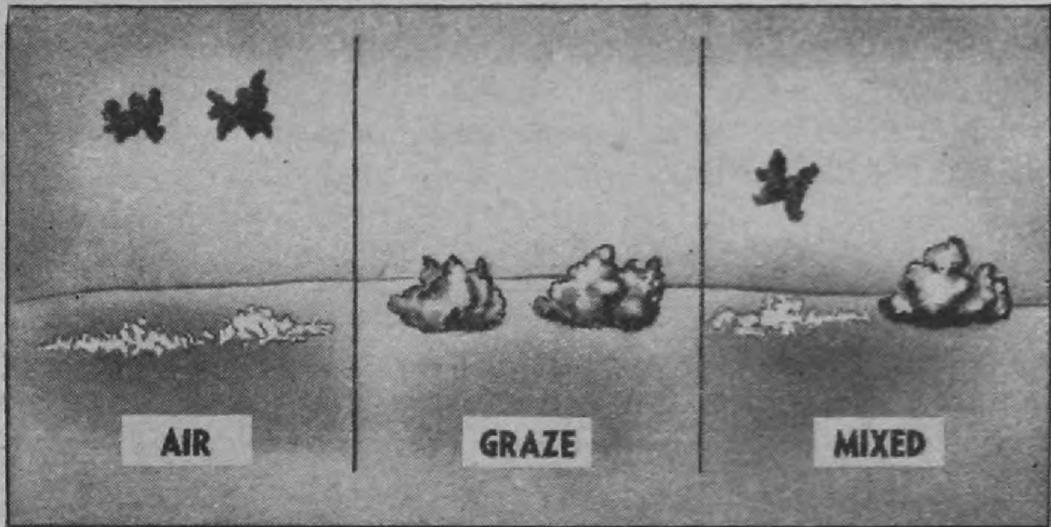


Figure 23. Time fire sensings.

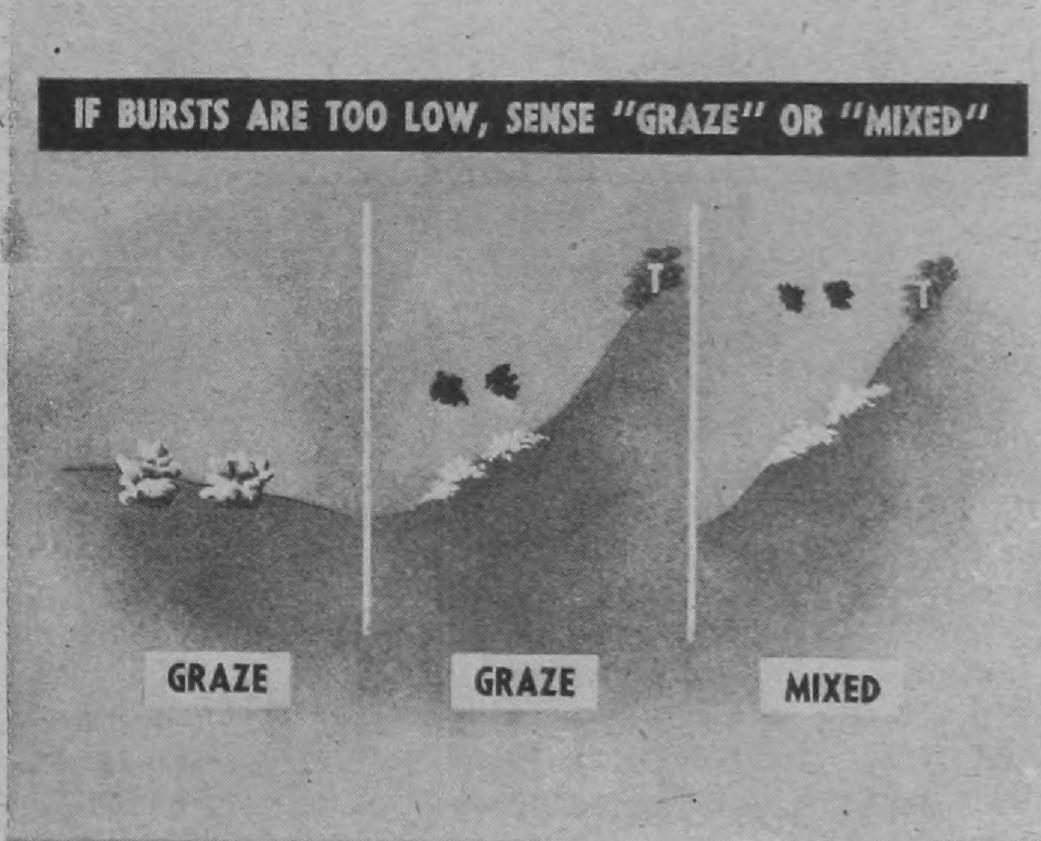
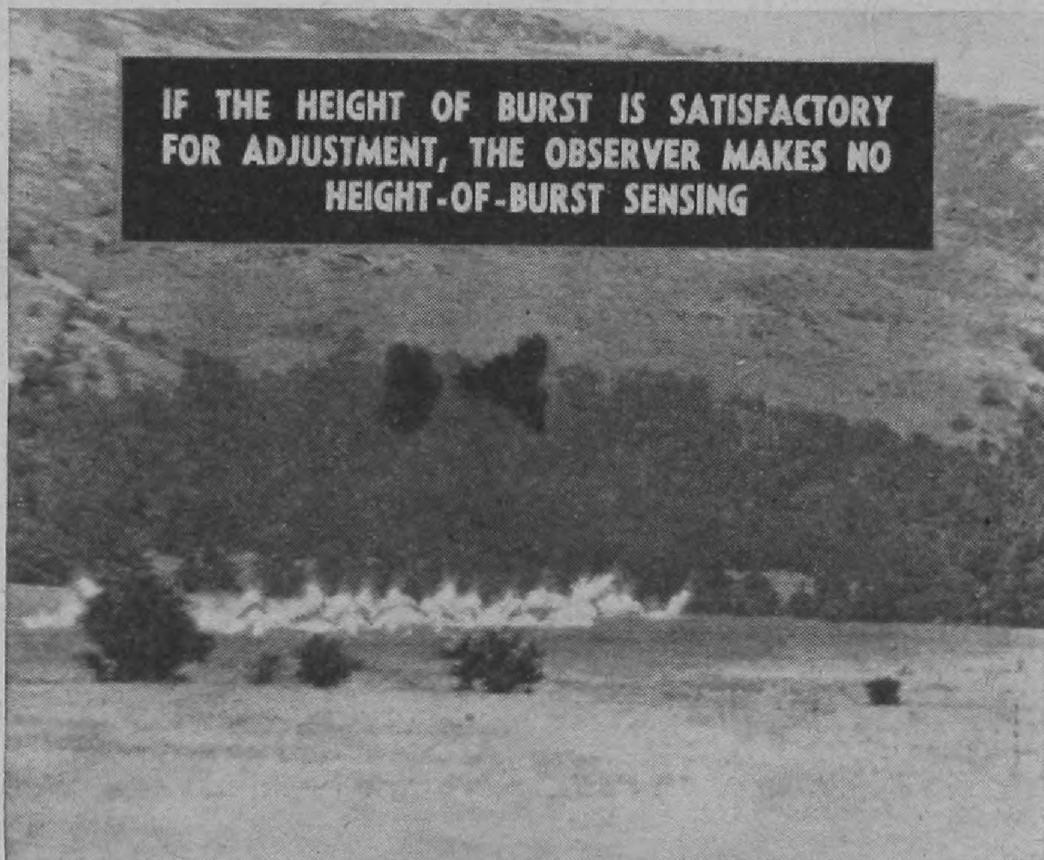


Figure 24. Sensings used to raise the height of burst.

that fact. The height of burst above the target may be estimated by comparison with known dimensions of objects at the same distance from the observer. The smoke of a 105-mm HE shell burst is about 8 to 10 yards in diameter at the instant of bursting.



IF THE HEIGHT OF BURST IS SATISFACTORY  
FOR ADJUSTMENT, THE OBSERVER MAKES NO  
HEIGHT-OF-BURST SENSING

Figure 25. Height of burst correct.

19. PRECISION FIRE. a. Adjustment is conducted by single piece. The observer reports sensings for these rounds as in bracket fire.

b. When a suitable adjustment has been obtained, the observer requests, "Fire for effect." A suitable adjustment has been obtained when, with a small (large) observer displacement, a 100-yard bracket in range (50-yard bracket in deflection) has been secured, accompanied by improvement of the deflection (range). The observer senses each round as *over* or *short* for range, and senses the deflection of the half-group in yards; for example, *over*, *over*, *short*, 30 left. Appropriate

corrections are made, and the second half-group is sensed in the same manner. Adjusted elevation is computed (at the battery or fire-direction center) as in axial precision. For destruction, fire is continued in groups of six rounds.

c. In a time registration, following determination of adjusted elevation, the procedure is the same as for axial time registration. The observer senses only *air* or *graze* for each round.



Figure 26. Sensing height of burst prior to requesting fire for effect.

d. The battery or fire-direction center reports changes in the number of rounds or method of fire to the forward observer, for example, "Three rounds on the way."

**20. CONVERSION OF SENSINGS TO COMMANDS.** To aid in the rapid adjustment of fire, the procedure of converting sensings to commands should be understood by the forward observer. Sensings may be converted to commands by personnel at the fire-direction center or at the battery. When

a target is designated by sensing a known point with reference to the target, and the target is to be plotted on a firing chart or observed-fire chart, the gun-target line is assumed to be a line generally through the center of the battalion area (or the adjusting battery) and the known point.

a. **Ricochet fire.** When the observer reports "Mine action," FUZE QUICK M48 (M51) is commanded.

b. (1) *Time bracket fire.* The value of  $20/R$  is added to the computed site. Height-of-burst sensings are acted upon by the fire-direction center by changing site as follows:

Sensing	Command
Graze (initial volley) . . . . .	U 10-20
Graze (subsequent volley) . . . . .	U 5
Mixed . . . . .	U 3
Air . . . . .	D 5
High air . . . . .	D 10
No sensing . . . . .	No change

Before fire for effect is begun, site is changed by the amount  $(20 \text{ minus height-of-burst sensing}) \div R$ .

(2) *Time registration.* The computer makes changes based on the sensings of the observer. The procedure is as follows: the mission being time registration, the adjusted elevation is determined as in FM 6-40. Succeeding rounds then are fired at the adjusted elevation. A round is fired with fuze set for time corresponding to the adjusted elevation. A graze (air) resulting, time is decreased (increased) in multiples of four-tenths of a second until an air (graze) is obtained. This bracket then is split until a bracket of four-tenths of a second is obtained. Two rounds are fired at the center of the bracket.

(a) If one is *air* and one is *graze*, the time used is the adjusted time.

*Example:*

Command	Sensing
Time 17.1, El 302 . . . . .	A
Time 17.5, 302 . . . . .	G
2 rds, Time 17.3, 302 . . . . .	A, G
Adj time = 17.3	

(b) If both are *air* (*graze*), one more round is fired at the *graze* (*air*) limit of the bracket.

i. If at the limit of the bracket one is *air* and one is *graze*, the time used is the adjusted time.

*Example:*

	<i>Command</i>	<i>Sensing</i>
Time 17.1, El 302.....		A
Time 17.5, 302.....		G
2 rds, Time 17.3, 302.....		A, A
1 rd, Time 17.5, 302.....		A
Adj time = 17.5.		

2. If both are *graze* (*air*), the adjusted time is the average of the limit of the bracket and the center.

*Example:*

	<i>Command</i>	<i>Sensing</i>
Time 17.1, El 302.....		A
Time 17.5, 302.....		G
2 rds, Time 17.3, 302.....		G, G
1 rd, Time 17.1, 302.....		A
Adj time = 17.2.		

c. **Method of fire.** During a bracket adjustment, method of fire usually is by volley. When fire is by a single battery, a 200-yard bracket is covered in fire for effect, unless the observer requests, "Center range" or "100-yard bracket." When 200-yard bracket is covered, the observer reports ineffective ranges which are then discarded.

## 21. ILLUSTRATIVE EXAMPLES. a. Bracket, forward observation-

Target: Mortars firing from a group of bushes.

Matériel: 105-mm howitzer M2. Ammunition: HE shell, delay fuze.

## Messages, sensings, and commands

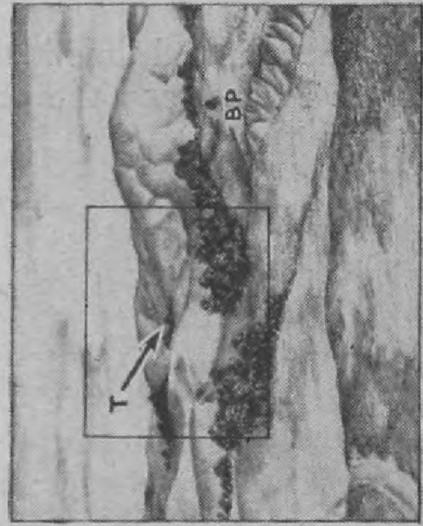
Obsr to Bn:

*Base point is 600 right, 30 below, 500 short, three mortars firing, will adjust.*

Bn to Obsr:

RICOCHET FIRE, CONCENTRATION 20, BATTERY A, WHEN READY.

## Results



## Remarks

Infantry company commander has pointed out target to observer. Battalion has directed that observer adjust battery A through the fire-direction center; personnel of battery A could have been required to handle the mission directly.

$100/R = 24, t = 10.$



Bn to Btry A:  
B ADJ, SH HE, CH 3, FD, BDL  
144, ON NO. 3 CL 3, SI 305,  
CENTER ONE RD, EL 286.

Bn to Obsr:  
ON THE WAY.

Obsr to Bn:  
100 left, 200 short.

Bn to Btry A:  
R 24, 306.

Bn to Obsr:  
ON THE WAY.

Obsr to Bn:  
*50 right, 100 over, mine action, fire  
for effect.*



Bn to Btry A:  
FQ, L 12, B ONE RD, Z 10 MILS,  
296.

Bn to Obsr:  
BATTERY A FIRING FOR  
EFFECT, QUICK FUZE M48.

Obsr to Bn:  
*Repeat fire for effect.*



Observer notes that although the area is covered, mortar fire continues to come from the area.

Messages, sensings, and commands	Results	Remarks
<p>Bn to Btry A: 296.</p> <p>Bn to Obsr: BATTERY A FIRING FOR EFFECT.</p> <p>Obsr to Bn: <i>Mortars neutralized.</i></p>		Mortar fire has ceased.

**b. Bracket, time, forward observation.**

Target: Infantry assembling for counterattack.

Matériel: 105-mm howitzer M2. Ammunition: HE shell, time fuze.

Ricochet has been found to be impracticable.

Photomap available.

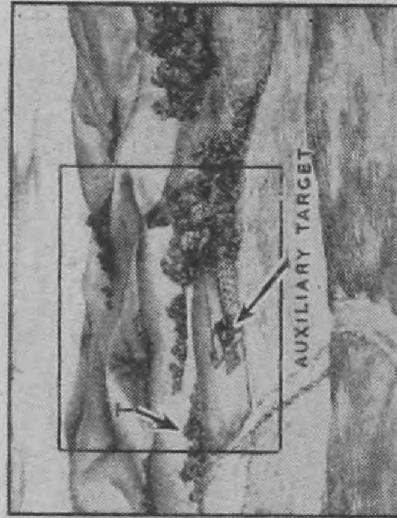
## Messages, sensings, and commands

Obsr to Bn:  
HN 3276, infantry assembling, auxiliary target, will adjust.

Bn to Obsr:  
TIME FIRE, CONCENTRATION  
24, BATTALION B, THREE  
ROUNDS,  $\frac{1}{2}$  C APART, AT MY  
COMMAND.

## Results      Remarks

Observer selects nearby building as auxiliary target.



Bn to Btry B:  
B ADJ, SH HE, CH 4, TIME 19.4,  
BDR 180, ON NO. 2 CL 2, SI 308,  
CENTER ONE RD, EL 423.

Bn to Obsr:  
ON THE WAY.

Obsr to Bn:  
Graze, 100 right, 200 over.



Bn to Btry B:  
L 20, U 20, TIME 18.3, 399.  
Bn to Obsr:  
ON THE WAY.  
Obsr to Bn:  
*High air, 50 right, 100 over.*



$100/R = 20$ .

Bn to Btry B:  
L 10, D 10, TIME 17.5, 387.  
Bn to Obsr:  
ON THE WAY.  
Obsr to Bn:  
*40 air, 400 right, 250 short, fire for effect.*



On his photo, the observer has previously measured the range and deflection changes (in yards) necessary for shifting the fire to the actual target.

Messages, sensings, and commands	Results	Remarks
<p>Bn to Btry B:</p> <p>L 80, D 4, B THREE RDS, AMC, TIME 19.1, 417 (similar commands are sent to batteries A and C. When all batteries report "Ready", the command FIRE is given).</p> <p>Bn to Obsr:</p> <p>BATTALION FIRING FOR EFFECT.</p> <p>Obsr to Bn:</p> <p><i>Area covered effectively.</i></p>		Observer notes mass of fire as a whole.

**c. Precision, time, forward observation.**

Target: Check point. Mission: Registration.

Matériel: 105-mm howitzer M2. Ammunition: HE  
shell, fuze M54.

## Messages, sensings, and commands

Bn to Obsr of Btry C:  
REGISTER BATTERY C ON  
CHECK POINT NO. 2, TIME  
FIRE. REPORT SENNSINGS TO  
BATTERY.

Bn to Btry C:  
FORWARD OBSERVER WILL  
REGISTER ON CHECK POINT  
NO. 2, TIME FIRE, SENNSINGS  
REPORTED TO BATTERY.

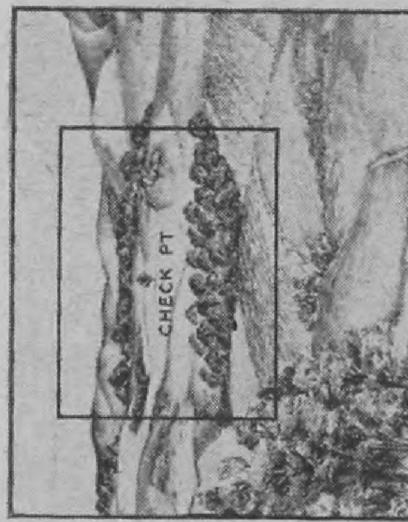
Obsr to Btry C:  
*Check point No. 2, will adjust.*

Computer to Ex:  
NO. 2 ADJ, SH HE, CH 5, FQ  
M54, BDL 348, SI 303, NO. 2 ONE  
RD, EL 318.

Btry to Obsr:  
ON THE WAY.

Obsr to Btry:  
*400 over.*

## Results



## Remarks

The remaining pieces of the battalion can execute other fire missions while the registration is fired. Each battery has a firing chart and can determine data. Personnel at the firing battery convert sensings to commands.

Observer does not know exact direction of fire; he decides to correct range only initially.



Computer to Ex:

281.

Btry to Obsr:  
ON THE WAY.

Obsr to Btry:  
*100 right, 100 short.*

Observer can now visualize direction of fire.

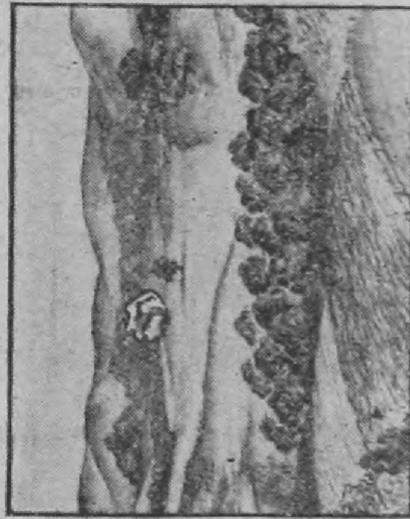


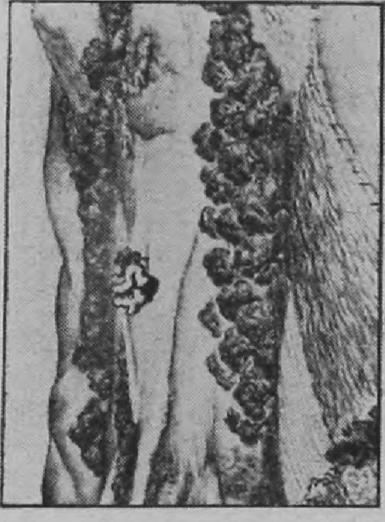
Computer to Ex:

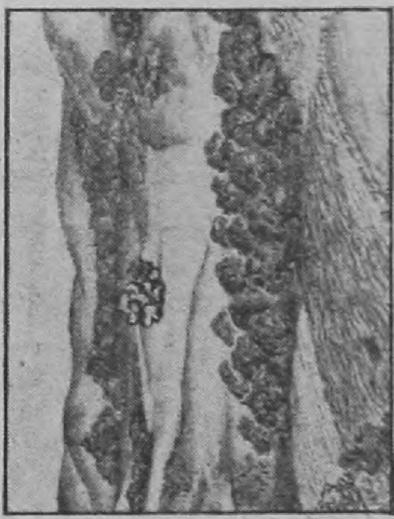
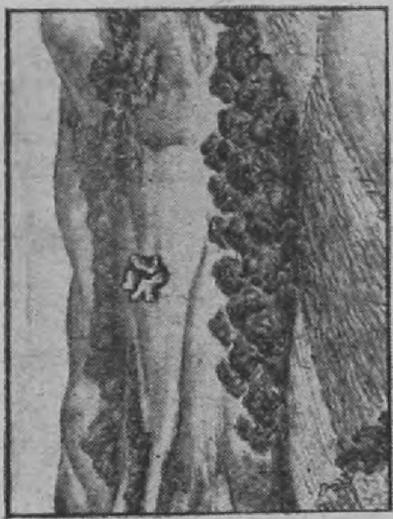
L 20, 289.

Btry to Obsr:  
ON THE WAY.

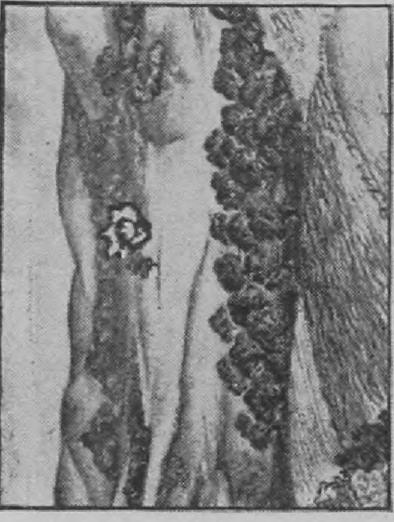
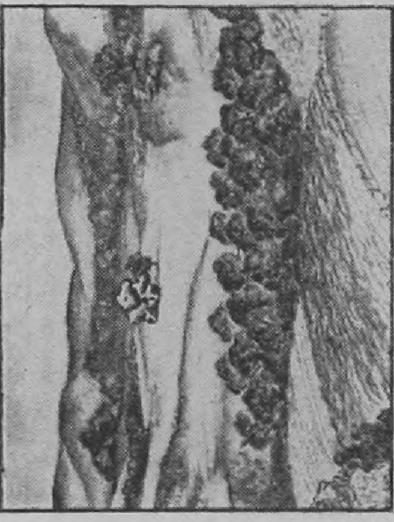
Obsr to Btry:  
*30 left,  
50 over,  
fire for effect.*



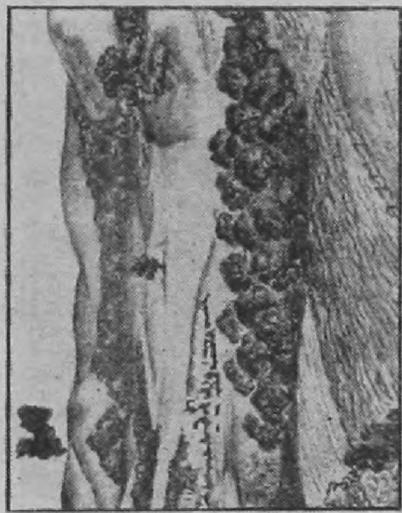
Messages, sensings, and commands	Results	Remarks
<p>Computer to Ex: R 6, THREE RDS, 285.</p> <p>Btry to Obsr: THREE ROUNDS ON THE WAY.</p> <p>Obsr to Btry: <i>Over, short, short, 10 right.</i></p>		



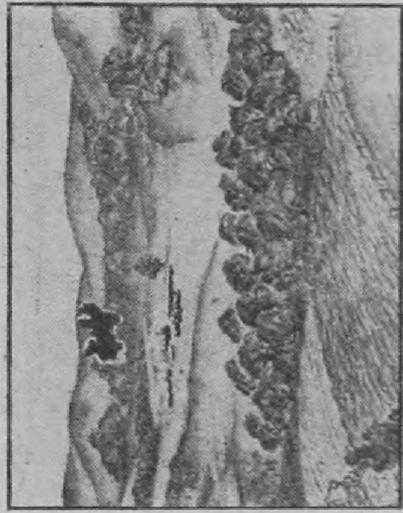
Computer to Ex:  
L2, 285.  
Btry to Obsr:  
ON THE WAY.  
Obsr to Btry:  
*Short,*  
*over,*  
*short.*

Messages, sensings, and commands	Results	Remarks
	 	

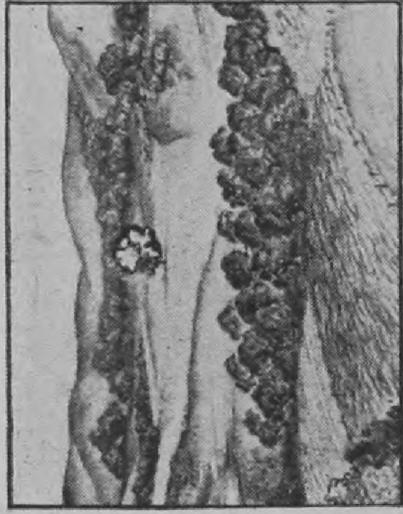
Computer to Ex:  
ONE RD, TIME 16.6, 286.  
Btry to Obsr:  
ONE ROUND, TIME FIRE, ON  
THE WAY.  
Obsr to Btry:  
*Air.*



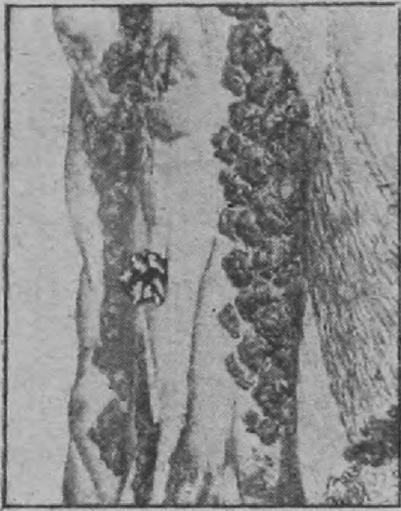
Computer to Ex:  
TIME 17.0, 286.  
Btry to Obsr:  
ON THE WAY.  
Obsr to Btry:  
*Air.*



The observer is notified  
when an element of  
the data is changed.

Messages, sensings, and commands	Results	Remarks
<p>Computer to Ex: TIME 17.4, 286.</p> <p>Btry to Obsr: ON THE WAY.</p> <p>Obsr to Btry: <i>Graze.</i></p>		
		<p>Computer to Ex: TWO RDS, TIME 17.2, 286.</p> <p>Btry to Obsr: TWO ROUNDS, ON THE WAY.</p> <p>Obsr to Btry: <i>Air, graze.</i></p>

Btry to Bn:  
ADJUSTED DATA, C, CHECK  
POINT NO. 2: CH 5, TIME 17.2,  
BDL 364, EL 286.



Map data for check point: Range 5380  
Shift L 348  
Site 303

Graphical firing table setting, charge 5: 286 opposite 5380,  
adjusted time gauge line over 17.2.

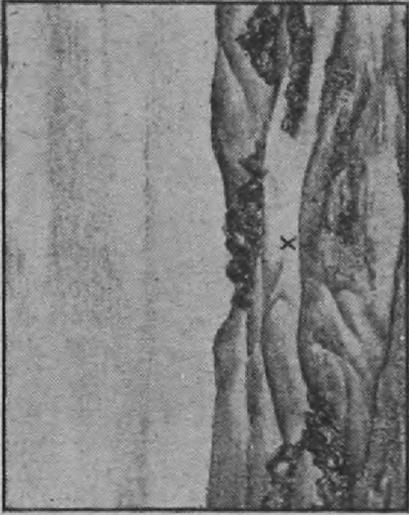
Deflection correction L 16 at 5400.

**d. Bracket, forward observation.**

Target: Machine gun firing from camouflaged position.

Mission: Neutralization.

Matériel: 155-mm howitzer Mr.

Messages, sensings, and commands	Results	Remarks
<p>Obsr to Bn:</p> <p><i>Concentration 438 is 200 right, 20 above, 250 over, machine gun dug in, request uniform converged sheaf and range correction, will adjust.</i></p> <p>Bn to Obsr:</p> <p>DELAY FUZE, CONCENTRATION 442, B, THREE VOLLEYS WHEN READY.</p>		<p>The battery is staggered in width and in depth. The target is about 200 yards from the observer; it is not visible. The concentrated fire of the battery is required. Mine action is sought. Initial data should surely give an over.</p>
<p>Bn to Btry B:</p> <p>B ADJ, SH HE, CH 3, FD, BDR 274, NO. 1 L 12, NO. 3 R 16, NO. 4 R 35, NO. 2 ONE RD, EL 442.</p> <p>Bn to Obsr:</p> <p>ON THE WAY.</p> <p>Obsr to Bn:</p> <p>200 right, repeat range.</p>		<p><math>C = 12, 100/R = 19.</math></p>

## Messages, sensings, and commands

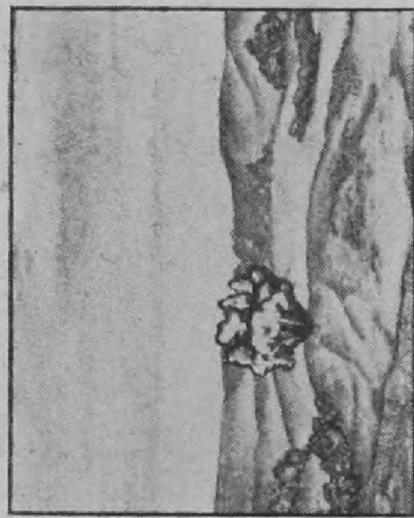
Bn to Btry B:  
L 38, 442.  
Bn to Obsr:  
ON THE WAY.

Obsr to Bn:  
*80 over.*

## Results



Creeping is appropriate  
when fire is close to  
friendly troops.



Bn to Btry B:  
432.  
Bn to Obsr:  
ON THE WAY.

Obsr to Bn:  
*30 left, 20 short, fire for effect at center range.*

Firing through a zone  
would endanger  
friendly troops.

Bn to Btry B:  
R 8, B three RDS, EL NO. 1 438,  
NO. 2 434, NO. 3 428, NO. 4 432.  
Bn to Obsr:  
B FIRING FOR EFFECT.  
Obsr to Bn:  
*10 right, 20 short, repeat fire for effect.*

No direct hit has resulted from the three volleys.



Bn to Btry B:  
L 2, EL NO. 1 440, NO. 2 436, NO.  
3 430, NO. 4 434.

A direct hit results.

Messages, sensings, and commands	Results Remarks
Obstr to Bn: <i>Machine-gun nest destroyed.</i>	

# INDEX

	<i>Paragraph</i>	<i>Page</i>
Adjustment of artillery fires by forward observers.....	12-21	29
Alternate observation posts.....	3b	2
Artillery observers.....	15-21	36
Axis of advance.....	9e	18
 •Bracket fire:		
Forward observation.....	20	45
Sensing.....	18	39
Time.....	20b	46
Time, forward observation.....	20b	46
Check list for observers.....	7	11
Close support.....	2	1
Communication.....	9f, 10	22, 25
Radio.....	10c	25
Special situations.....	10d	26
Wire.....	10b	25
Contact with supported unit.....	4a, 8, 9	3, 14, 15
Conversion of sensings to commands.....	20	45
Cover for observation posts.....	5	4
Enemy defilade.....	4	3
Equipment of forward observer.....	8	14
 Fire for effect:		
Bracket fire.....	18e	40
Precision fire.....	19b	44
Flank observation.....	4	3
Forward observer party.....	8, 9	14, 15
Forward slope position.....	4b	4
Hints for forward observer.....	11	27
Hints for nonartillery observers.....	14	32
Illustrative examples.....	21	47
Bracket, forward observation.....	21a, d	47, 64
Bracket, time, forward observation.....	21b	51
Precision, time, forward observation.....	21c	55
Information of value to enemy.....	8, 15	14, 36
Liaison with supported arm.....	2, 9	1, 15
Observation as supplement to.....	2	1
Locating targets.....	2	1
By supported unit.....	9e	18

	<i>Paragraph</i>	<i>Page</i>
Map location.....	3b, 9	2, 15
Missions of forward observer.....	8	14
Negative reports.....	6, 9e	11, 18
Nonartillery observers.....	13, 14	30, 32
Obliques.....	3b	2
Observation:		
Air.....	2	1
Battalion and battery.....	2	1
Defiladed areas.....	3b	2
Flank.....	4	3
Forward.....	2, 8	1, 14
Ground.....	2, 3	1, 2
Locating targets.....	2	1
Maneuver of.....	2	1
Posts:		
Alternate.....	3b	2
Cover for.....	5	4
Organization and operation.....	3b, 5	2, 4
Selection of.....	4, 9e	3, 18
Visitors'.....	3b	2
Sound and flash.....	2	1
Observers:		
Artillery.....	15-21	36
Check list for.....	7	11
Communication.....	10	25
Forward:		
Equipment.....	8, 9	14, 15
Hints for.....	11	27
Procedure of.....	9	15
Type of conveyance.....	9g	22
Nonartillery.....	13, 14	30, 32
Prearrangement by.....	15	36
Reports.....	6, 7	11
Orientation of map.....	3b	2
Panoramic sketch.....	3b, 9e	2, 18
Precision fire.....	19, 21c	29, 55
Procedure of forward observer.....	9	15
Radio communication.....	10c	25
Recorder.....	3b	2
Relief.....	3b, 7	2, 11
Reports:		
Negative.....	6	11
Observer's.....	6, 7, 18g	11, 41
To observer.....	17, 19d	39, 45
Reverse slope position.....	4b	4
Ricochet fire.....	18f, 20c	41, 47

	<i>Paragraph</i>	<i>Page</i>
Selection of observation posts.....	4	3
Sensing, bracket fire.....	18	39
Slopes:		
Forward.....	4b	4
Reverse.....	4b	4
Special situations.....	10d	26
Stereo pairs.....	3b	2
Supported arms.....	1	1
Contact with.....	4a, 8	3, 14
Surveillance of prearranged fires.....	2	1
Tactical principles.....	1-11	1
Target designation.....	16, 20b	37, 46
"Target-getter".....	1b	1
Targets of opportunity.....	2	1
Time fire.....	18h, 19c, 20	42, 45
Type of conveyance of observer.....	9g	22
Use of overlapping channels.....	10d	26
Visitors' observation posts.....	3b	2
Wire communication.....	10b	25



